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RAILROAD machine shops are humming with activity these days . . . activity that has kept railroad rolling stock moving day and night hauling precious loads of troops and war materiel to embarkation points and factories all over America.

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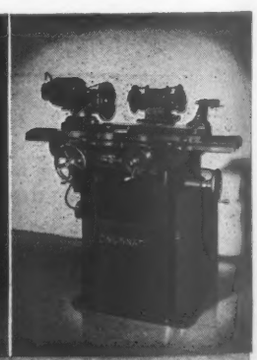
CINCINNATI No. 3 Centerless Grinding Machine



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B. & O. 2-8-8-4 Locomotives

Baldwin builds 20 articulated single expansion freight locomotives for service on heavy main-line grades

THE Baltimore & Ohio is now placing in service 20 articulated locomotives of the 2-8-8-4 type, which were built by the Baldwin Locomotive Works. They will operate over the 17-mile grade west of Cumberland, Md., on the main line to Cincinnati, Ohio and St. Louis, Mo. The grade in question extends from Piedmont, W. Va., to Altamont, at the summit of the Alleghenies, the maximum being 2.2 per cent westbound.

The new locomotives are designated as Class EM-1, and have been assigned the road numbers 7600 to 7619, inclusive. The rated tractive force is 115,000 lb. and the average driving axle load about 60,600 lb. The locomotives are designed to traverse curves as sharp as 18 deg. The height overall is 15 ft. 11 in., and the maximum width 10 ft. 10 in. while the length of the locomotive and tender, measured over the coupler knuckles is 125 ft. 9⅝ in.

The boiler is of the straight-top type, 96⅛ in. in diameter at the front end, and having a total length, including the smokebox of 59 ft. 5 in. It is built of carbon steel plates, with three rings in the barrel, the plates being 1 in. and 1 1/32 in. thick. The circumferential seams are triple-riveted, and the longitudinal seams have saw-tooth welt strips. These latter seams, on the first and second rings, are welded for a length of 16 in. at each end; while the seam on the third ring is welded throughout its full length. The dome, placed on the second ring, has a diameter of 36 in. and a height of 9 in.

The large firebox volume is a special feature of this boiler. The firebox proper has a length of 228 in., of which the grates occupy 177 in. There is also a combustion chamber, 90 in. long, extending forward into the boiler barrel so that the total inside firebox length, from the door sheet to the back tube sheet is 26 ft. 6 in. The seams in the firebox and combustion chamber are welded, including the seam surrounding the door opening, while the inside and outside firebox sheets are welded to the mud ring. The grate area is 11.6 sq. ft. and the total firebox volume 892 cu. ft. Five Nicholson thermic syphons are installed, three in the firebox proper and two placed one in front of the other in the combustion chamber. The Type E Elesco superheater is placed in 177 flues, 4 in. in diameter. The flue length is 20 ft. 6 in. and the minimum gas area through the flues and tubes is 11.21 sq. ft.

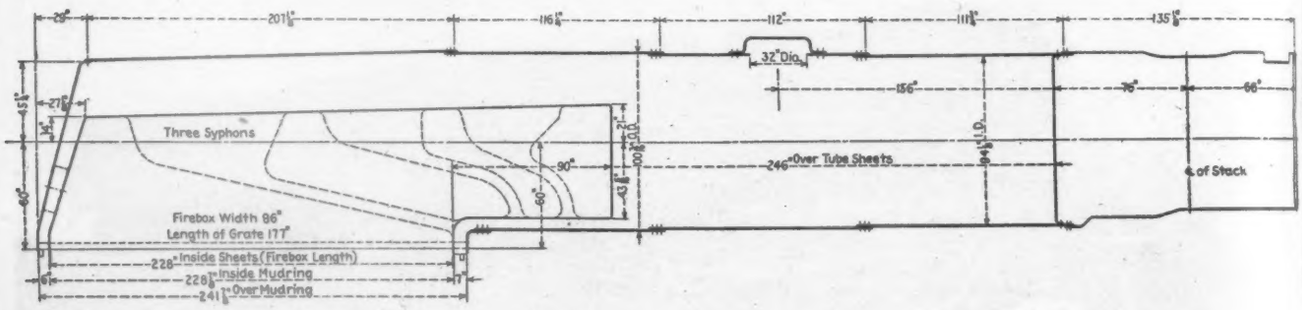
Hulson grates are applied, and the stoker is a Standard Type HT-M which fires through the door opening. The ash pan has three large hoppers with swing bottoms, which are operated from the ground. The boiler is fed by an 12,500 gal. Ohio injector and also by a Worthington 6 SA feedwater heater which, with its connecting piping, is installed in the smokebox. The cold-water pump is on the left side at the rear end and the hot-water pump is mounted on the smokebox front. The heater receives its exhaust steam supply from both pairs of cylinders. Each pair exhausts through a separate nozzle of the annular ported type, and the nozzles discharge up twin stacks. A Cyclone front end arrangement is installed in the smokebox.

The boiler accessories include a flue blower and an Ohio low-water alarm. The air compressors and the blower are operated with superheated steam. Three Coale

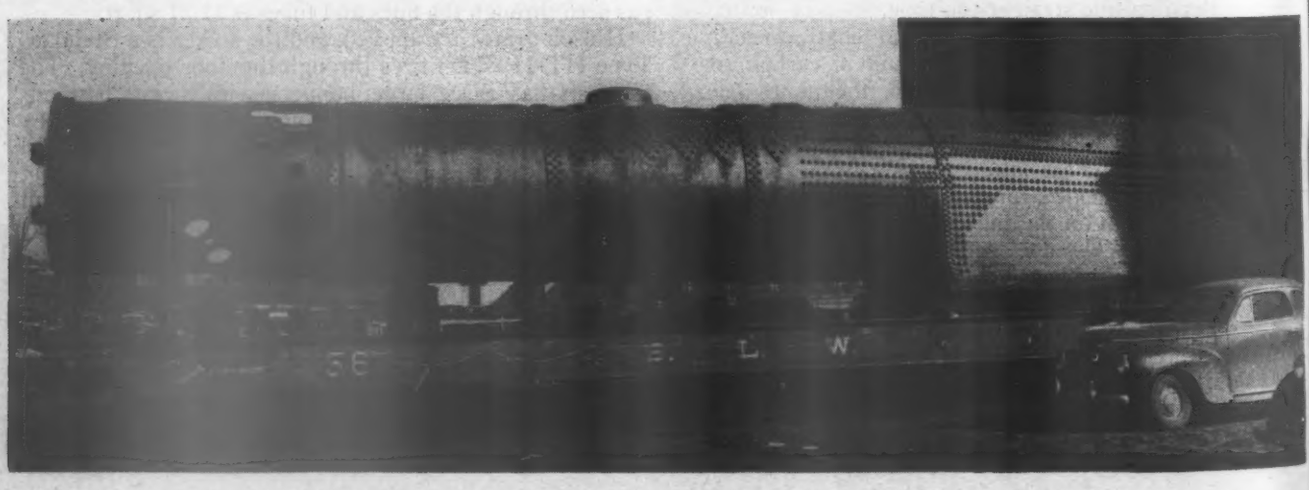
Table I—General Dimensions, Weights and Proportions of Baltimore & Ohio 2-8-8-4 Type Freight Locomotives

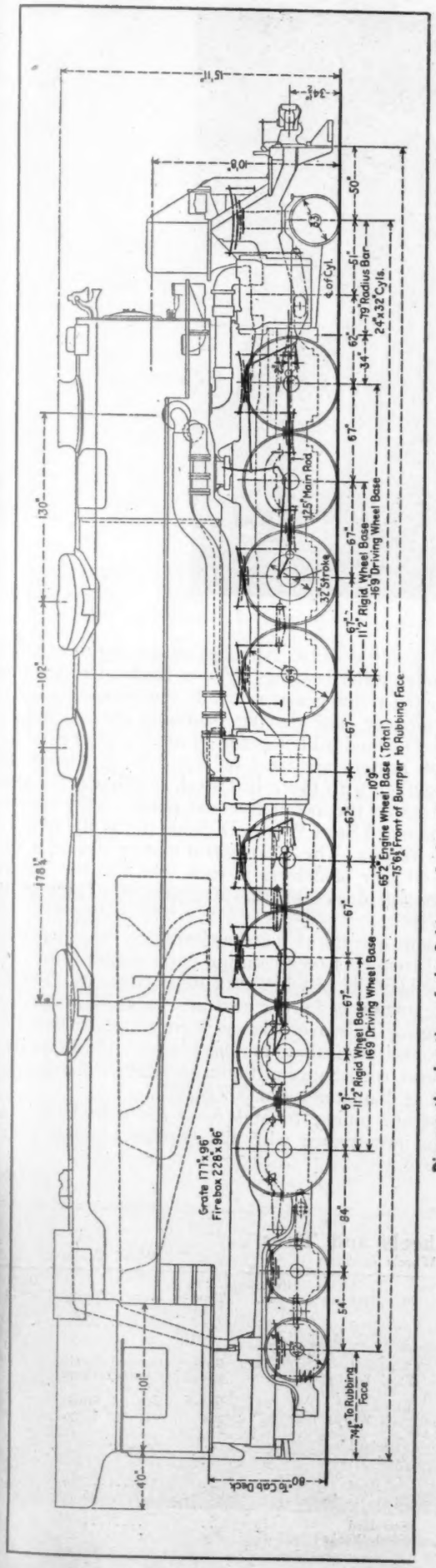
Road class	EM1
Road numbers	7600-7619
Date built	1944
Steam pressure, lb. per sq. in.	235
Drivers, diameter, in.	64
Cylinders, number, diameter and stroke, in.	(4) 24 x 32
Rated tractive force, engine, lb.	115,000
Valve gear, type	Walschaerts
Valves, piston, diameter, in.	12
Maximum travel, in.	7
Steam lap, in.	1¼
Exhaust clearance, in.	Line and Line
Lead, in.	3/16
Cut-off in full gear, per cent	85.3
Dimensions:	
Height, rail to top of stack, ft.-in.	15—11
Height, rail to center of boiler, ft.-in.	10—8
Width overall, ft.-in.	10—4
Length over engine and tender, ft.-in.	121—10⅝
Cylinder centers, in.	93
Wheel bases, ft.-in.:	
Driving	44—3
Rigid	11—2
Engine, total	65—2
Engine and tender, total	112—6
Weights, lb.:	
Front truck	50,700
Drivers	485,000
Trailer truck	93,000
Engine, total	628,700
Tender (⅔ loaded)	304,000
Weight on drivers per cent weight of engine	77.2
Weight on drivers ÷ tractive force	4.22
Tender:	
Style or type	Rectangular
Water capacity, U. S. gal.	22,000
Fuel capacity, tons	25
Trucks	Six-wheel

Table II—General Dimensions and Proportions of the Boiler



Steam pressure, lb.	235
Diameter, first ring, inside, in.	94⅛
Diameter, first ring, outside, in.	96⅛
Diameter second ring, outside, in.	98⅛
Diameter third ring, inside, in.	98⅛
Diameter third ring, outside, in.	100 3/16
Sheet thicknesses, in.:	
Smokebox	5/16
First ring	1
Second ring	1
Third ring	13/32
Back head	9/16
Side sheets	9/16
Roof sheet	15/16
Furnace door sheet	5/16
Furnace side sheets	5/16
Furnace crown sheet	5/16
Combustion chamber	1/2
Front tube sheet	5/16
Back tube sheet	1/2
Firebox length, in.	228
Grate, length, in.	177
Firebox width, in.	96
Water space, front, in.	7
Water space, back, in.	6
Water space, sides, in.	6
Combustion chamber length, in.	90
Arch tubes, number and diameter	None
Syphons, number and location	3 in firebox 2 in comb. chamber
Tubes, number and diameter	63—2¼
Flues, number and diameter	177—4
Length over tube sheets, ft.-in.	20—6
Net gas area through tubes and flues, sq. ft.	11.21
Superheater, type	E
Fuel	Bit. coal
Grate area, sq. ft.	117.5
Stoker, type	Standard HT-M
Feedwater heater, type	Worthington 6SA
Heating surfaces, sq. ft.:	
Firebox	380
Combustion chamber	165
Arch tubes	None
Syphons	211
Firebox, total	756
Tubes	757
Flues	3,785
Evaporative, total	5,298
Superheating	2,118
Comb. evap. and superheat.	7,416
Boiler proportions:	
Firebox heat. surf. per cent comb. heat. surf.	10.1
Tube-flue heat. surf. per cent comb. heat. surf.	61.4
Superheat. surf. per cent comb. heat. surf.	28.5
Firebox heat. surf. ÷ grate area	6.43
Tube-flue heat. surf. ÷ grate area	38.65
Superheat. surf. ÷ grate area	18.02
Comb. heat. surf. ÷ grate area	63.11
Gas area ÷ grate area	0.095
Evap. heat. surf. ÷ grate area	45.08
Tractive force ÷ grate area	978.0
Weight of engine ÷ evap. heat. surf.	118.6
Weight of engine ÷ comb. heat. surf.	84.7
Tractive force ÷ evap. heat. surf.	21.7
Tractive force ÷ comb. heat. surf.	15.5
Tractive force × diameter drivers ÷ comb. heat. surf.	992.0





Diagramatic elevation of the Baltimore & Ohio 2-8-8-4 single-expansion articulated freight locomotive

safety valves, 4 in. in diameter, are tapped into the boiler shell immediately back of the steam dome.

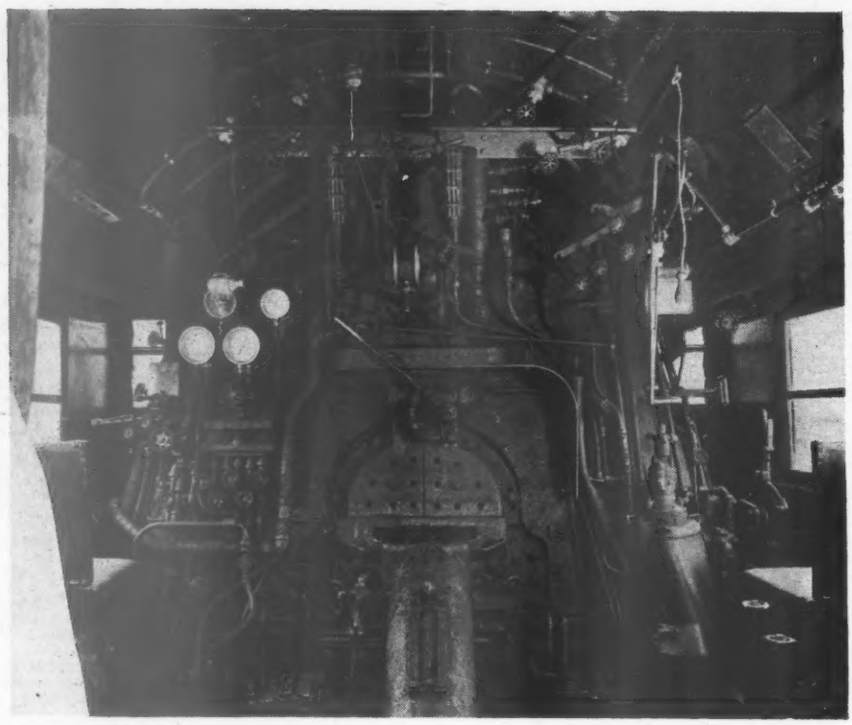
The chassis consists of two bed castings furnished by the General Steel Castings Corporation and having integral cylinders. The radius bar for the articulated frame connection is cast in one piece with the front bed, so that flexibility is provided in a horizontal plane only. The equalization system on each unit is continuous from front to back, the forward system having the usual arrangement

Partial List of Materials and Equipment on the Baltimore & Ohio 2-8-8-4 Type Freight Locomotives

Tires; engine-truck wheels	Standard Steel Works Division of the Baldwin Locomotive Works, Philadelphia, Pa.
Roller bearings	Timken Roller Bearing Company, Canton, Ohio.
Radial buffer; drawbar; firedoor	Franklin Railway Supply Co., Inc., New York.
Lateral motion cushioning device	American Locomotive Co., New York. The Timken Roller Bearing Co., Canton, Ohio.
Front bumper; engine and trailer truck; engine bed; driving-wheel centers	General Steel Castings Corp., Eddystone, Pa.
Driving and truck springs	Crucible Steel Co. of America, New York.
Couplers	Buckeye Steel Castings Co., Columbus, Ohio.
Brake equipment	Westinghouse Air Brake Co., Wilmerding, Pa.
Cocks and valves; cylinder cocks	The Okadee Company, Chicago. The Lunkenheimer Company, Cincinnati, Ohio.
Crosshead; axles, engine and tender	Baldwin Locomotive Works, Inc., Philadelphia, Pa.
Drifting and by-pass valves; pressure grease fittings	The Prime Manufacturing Co., Milwaukee, Wis.
Power reverse gear	American Locomotive Co., New York.
Valve cages; rings; bull rings	Hunt-Spiller Manufacturing Corporation, Boston, Mass.
Piston valve steam packing; piston rod packing; sanders	U. S. Metallic Packing Co., Philadelphia, Pa.
Front end hinges	The Okadee Company, Chicago.
Pistons and rings	Locomotive Finished Material Co., Atchison, Kan.
Washout and inspection plugs	Huron Mfg. Co., Detroit, Mich.
Safety valves	Coale Muffler & Safety Valve Co., Baltimore, Md.
Mechanical lubricators	Edna Brass Mfg. Co., Cincinnati, Ohio. Nathan Manufacturing Co., New York.
Lubricator tubing	Bundy Tubing Co., Detroit, Mich.
Pipe; air and injector lines	A. M. Byers Co., Pittsburgh, Pa.
Pipe covering	Union Asbestos & Rubber Co., Chicago.
Superheater; tangential steam dryer	The Superheater Company, New York.
Throttle	American Throttle Co., New York.
Syphons	Locomotive Firebox Co., Chicago.
Boiler tubes and flues; superheater pipes	National Tube Co., Pittsburgh, Pa.
Brick arch	American Arch Co., Inc., New York.
Staybolts	Falls Hollow Staybolt Co., Cuyahoga Falls, Ohio. Flannery Bolt Co., Bridgeville, Pa.
Water gage	Talmadge Mfg. Co., Cleveland, Ohio.
Feedwater heater	Worthington Pump and Machinery Corp., Harrison, N. J.
Injector	Ohio Injector Co., Wadsworth, Ohio.
Grates	Hulson Grate Co., Keokuk, Iowa.
Stoker	Standard Stoker Co., Inc., New York.
Gages, air and steam	Ashton Valve Co., Boston, Mass.
Coal sprinkler	Wm. Sellers & Co., Inc., Philadelphia, Pa.
Headlight and generator; cab classification and marker lamps	The Pyle-National Company, Chicago.
Bell ringer	Railway Service and Supply Corp., Indianapolis, Ind.
Low water alarm	Ohio Injector Co., Wadsworth, Ohio.
Flexible joints between engine and tender	Barco Manufacturing Co., Chicago.
Tender:	
Water bottom underframe	General Steel Castings Corp., Eddystone, Pa.
Trucks	Buckeye Steel Castings Co., Columbus, Ohio.
Coupler; draft gear	National Malleable and Steel Castings Co., Cleveland, Ohio.
Brakes	American Steel Foundries, Chicago.
Truck snubbers	Cardwell Westinghouse Co., Chicago.
Roller bearings	(10) SKF Industries, Philadelphia, Pa. (10) Timken Roller Bearing Company, Canton, Ohio.

of equalizer between the driving wheels and leading truck. The load is transferred to the truck through two leaf springs, placed longitudinally on either side of the center line and seated on the truck center pin.

The weight of the boiler is transferred to the front bed through a single waist bearer, placed under the smokebox



and above the second driving axle. The underside of the smokebox is flattened, and the bearer casting is welded to it. A centering spring is placed between the second and third pairs of drivers.

The steam distribution to all cylinders is controlled by 12-in. piston valves having a steam lap of 1¼ in. The valves, which are of B. & O. standard design, are operated by Walschaerts motion. They are set with a travel of 7 in. and a lead of 3/16 in., and cut off at 85.3 per cent in full gear. The Alco Type H power reverse is supported on the boiler, above the right-hand rear cylinder and the front and back reverse shafts are connected by a single reach rod placed on the center line, and having a flexible joint which is guided between the inner walls of the rear cylinder saddle. Needle bearings are used in the valve gear connections.

The pistons take B. & O. standard packing rings, and the crossheads, of the multiple-bearing type, are of forged steel with separate shoes. The main and side rods are of normalized and tempered carbon steel, the side rods having a rectangular section. Floating bushings are used on the main and side rod connections to the main pins, and steel spacing rings are placed on the pins between the main and side rod stubs. All axles on the engine are fitted with Timken roller bearings. Ten of the tenders are fitted with Timken roller bearings, while the remaining 10 are SKF equipped. The driving pedestals are so designed that B. & O. standard boxes can be applied if desired.

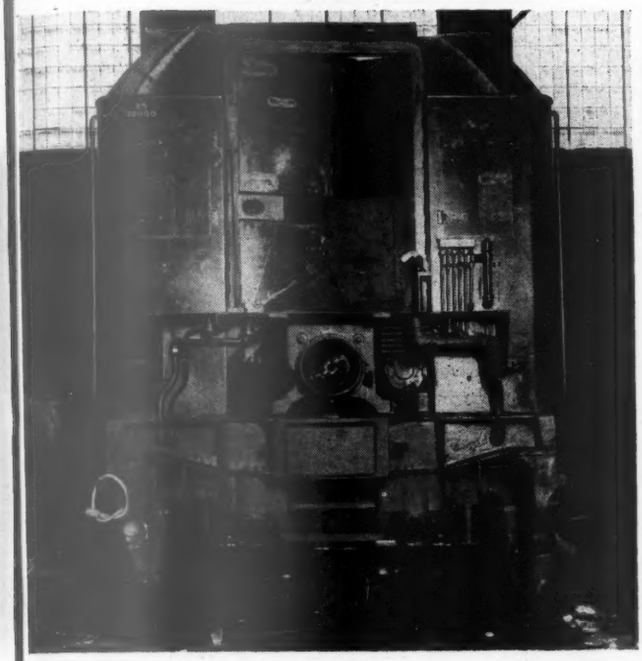
Boxpok centers are used on the driving wheels, and these, together with the rolled steel, multiple wear truck wheels used on the locomotive and tender, were supplied by the Standard Steel Works Division of the Baldwin Locomotive Works. The Alco lateral motion device is used on the first pair of drivers in each unit and the Timken lateral motion device on the first pair of wheels in the trailing truck.

The main drivers of these engines are cross balanced. The total weight of reciprocating parts on one side of the engine is 3,050 lb. of which 912 lb. is balanced. The unbalanced portion is 3.4 per cent per 1,000 lb. of total engine weight. This overbalance is equally distributed between front, intermediate and back wheel, 152 lb. to each. There is no overbalance at the main wheel. The dynamic augment at diameter speed is 7,800 lb.

The steam piping to and from the cylinders is arranged in accordance with the regular practice of the

Table III—Axles, Bearings, Wheels and Tires

	Axles				Wheels or Tires			Wheel Centers		
Location	Material	Manufacturer	Bearings	Journal diameter, in.	Type and material	Manufacturer	Diameter, in.	Type	Manufacturer	Diameter, in.
Front truck	Annealed carbon steel	Baldwin Locomotive Wks.	Timken	8¼	Multiple wear rolled steel	Standard Steel Works	33	..	.....	..
Drivers, main	Annealed carbon steel	Baldwin Locomotive Wks.	Timken	12⅜	A.A.R. Class B steel	Standard Steel Works	64	Box-pok	General Steel Castings Corp.	56
Drivers, other	Annealed carbon steel	Baldwin Locomotive Wks.	Timken	11⅛	A.A.R. Class B steel	Standard Steel Works	64	Box-pok	General Steel Castings Corp.	56
Trailer, front	Annealed carbon steel	Baldwin Locomotive Wks.	Timken	7½	Multiple wear rolled steel	Standard Steel Works	42	..	.....	..
Trailer, rear	Annealed carbon steel	Baldwin Locomotive Wks.	Timken	7½	Multiple wear rolled steel	Standard Steel Works	42	..	.....	..
Tender	Annealed carbon steel	Baldwin Locomotive Wks.	Timken-SKF	6½	Multiple wear rolled steel	Standard Steel Works	36	..	.....	..



builders for single expansion articulated locomotives. External pipes, placed right and left, carry the live steam supply from the superheater header in the smokebox to the rear cylinders. Here each pipe divides, one branch leading to the corresponding steam chest. The other branches, one right-hand and one left-hand, unit on the center line of the locomotive, and carry the steam to the front cylinders through a single ball-jointed pipe. The exhaust from the rear cylinders is carried to the smokebox through outside pipes, placed right and left while that from the front cylinders passes through a central pipe, fitted with a ball joint at each end and an intermediate slip joint. All flexible connections in the steam piping are designed to take Baltimore & Ohio standard packing.

There are two sandboxes, each of 2,500 lb. capacity, placed over the boiler. Sand can be delivered front and back of the main drivers, and ahead of the front drivers on each unit. A rail washing device is placed under the cab, for the purpose of cleaning the rails of sand.

The two cross-compound air compressors are mounted low down on the forward end of the bed. The drivers are braked at 50 per cent, based on 50 lb. brake cylinder pressure and the tender at 85 per cent of the light weight based on the same pressure.

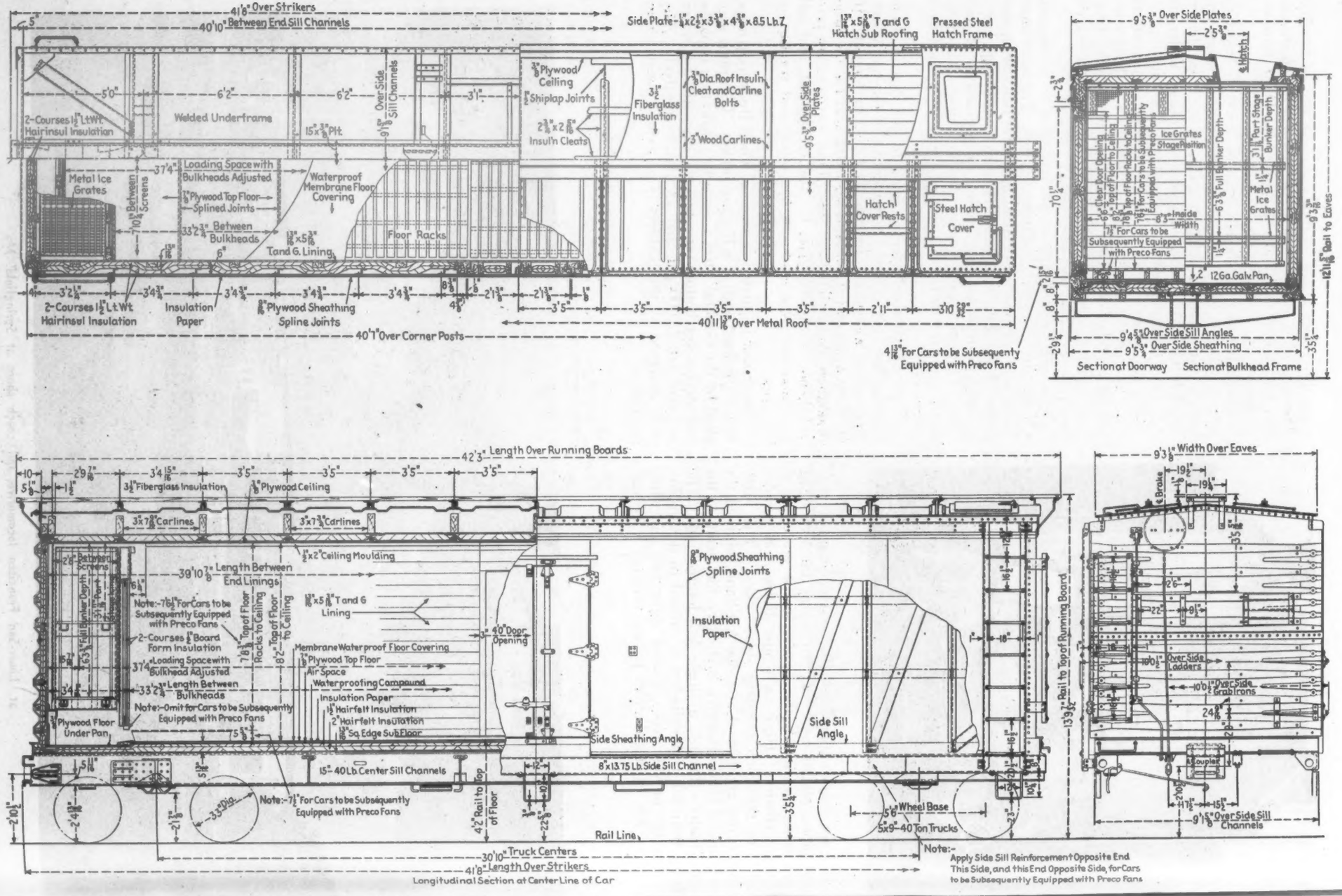
Two force-feed lubricators are placed on each unit, and are operated from the combination levers. The lubricators on the left side provide cylinder and valve lubrication, and those on the right side chassis lubrication. Flange lubrication is provided on the leading driving wheels of each unit. The crank pins are grease lubricated. The main crank pins are hollow-bored and the bore is used as a grease cup.

These locomotives have roomy cabs and careful attention has been given to the arrangement of the equipment. The cab, of welded construction is 8 ft. 5 in. long and 10 ft. 4 in. wide, and it contains an extra seat for the head brakeman, on the left-hand side. Foot warmers are provided, non-shattering glass is used throughout, and full provision has been made for the safety and comfort of the crew.

The tender is carried on two six-wheel Buckeye trucks, which are fitted with A.S.F. clasp brakes. The frame supplied by the General Steel Castings Corporation is of the cast-steel water-bottom type, and the capacities for water and coal are 22,000 gal. and 25 tons, respectively. The tank, designed by the builders is of welded construction throughout.

* * *

St. Louis-San Francisco locomotive and coach shops at Springfield, Mo.


41'8" Over Strikers
40'10" Between End Sill Channels
Side Plate-¼x2½x3⅜x4½x8.5 Lb Z
⅛"x5⅜" T and G Hatch Sub Roofing
Pressed Steel Hatch Frame
Welded Underframe
15"x⅜" Plt.
Over Side Sill Channels
⅜" Plywood Ceiling
½" Shiplap Joints
2½"x2⅛" Insul'n Cleats
3½" Fiberglass Insulation
3⅜" Dia. Roof Insul'n Cleat and Carline Bolts
3" Wood Carlines
Over Side Plates
2-Courses 1½" Lt.Wt. Hairinsul Insulation
Metal Ice Grates
Between Screens
Loading Space with Bulkheads Adjusted
1⅛" Plywood Top Floor-Splined Joints
Between Bulkheads
6"
Waterproof Membrane Floor Covering
⅛"x5⅜" T and G. Lining
Floor Racks
Hatch Cover Rests
Steel Hatch Cover
Insulation Paper
⅜" Plywood Sheathing Spline Joints
40'1" Over Corner Posts
40'11 13/16" Over Metal Roof
4 13/16" For Cars to be Subsequenty Equipped with Preco Fans
9'5 3/8" Over Side Plates
Hatch
Ice Grates Stage Position
Full Bunker Depth
Part Stage Bunker Depth
Inside Width
7½" For Cars to be Subsequently Equipped with Preco Fans
12 Ga. Galv. Pan
Metal Ice Grates
9'4 5/8" Over Side Sill Angles
9'5 3/8" Over Side Sheathing
Rail to Eaves
Section at Doorway
Section at Bulkhead Frame
42'3" Length Over Running Boards
3½" Fiberglass Insulation
⅜" Plywood Ceiling
3"x7⅜" Carlines
½"x2" Ceiling Moulding
39'10 7/8" Length Between End Linings
Note:-7⅝" For Cars to be Subsequently Equipped with Preco Fans
Top of Floor to Ceiling
Top of Floor to Racks
2-Courses ⅝" Board Form Insulation
Membrane Waterproof Floor Covering
1⅛" Plywood Top Floor
Air Space
Waterproofing Compound
Insulation Paper
1½" Hairfelt Insulation
2" Hairfelt Insulation
⅛" Sq. Edge Sub Floor
Loading Space with Bulkhead Adjusted
Length Between Bulkheads
Note:-Omit for Cars to be Subsequently Equipped with Preco Fans
Plywood Floor Under Pan
15"-40 Lb. Center Sill Channels
Note:-7½" For Cars to be Subsequently Equipped with Preco Fans
Rail to Top of Floor
⅜" Plywood Sheathing Spline Joints
Insulation Paper
40" Door Opening
Side Sheathing Angle
Side Sill Angle
8"x13.75 Lb. Side Sill Channel
Rail Line
30'10" Truck Centers
41'8" Length Over Strikers
Longitudinal Section at Center Line of Car
9'3⅛" Width Over Eaves
Brake
Over Side Ladders
Over Side Grab Irons
Coupler
9'1 5/8" Over Side Sill Channels
13'9 7/32" Rail to Top of Running Board
5'6" Wheel Base
5'x9"-40 Ton Trucks
Note:-
Apply Side Sill Reinforcement Opposite End
This Side, and this End Opposite Side, for Cars
to be Subsequently Equipped with Preco Fans

Plywood Used Extensively in

Forty-Ton Refrigerator Cars

Two hundred and twenty-five 40-ft. end-ice-bunker refrigerator cars are being constructed at the Chicago plant of the Fruit Growers Express Company. Although these cars follow a design which has been in general use for a number of years they are interesting particularly because of the amount of plywood which enters into their construction and because of the type of adjustable ice bunker

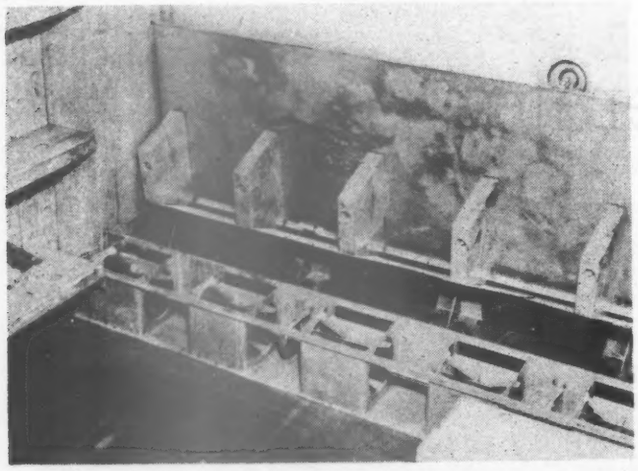
Some cars fan equipped — Ice bunkers adjustable for stage icing — Movable bulkheads add four feet to lading length when icing is not required

Loading length of cars is increased to 37 ft. 4 in. when the bulkheads are in the collapsed position—The ice grates serve as extensions of the floor racks when cars are used in non-iced service

which this company has developed for use on its equipment. The cars are being allocated to two different companies with the Western Fruit Express receiving 50 and the Fruit Growers Express 175. The cars which the Western is receiving are equipped with ventilating fans furnished by the Pacific Railway Equipment Company. Installation of these fans requires minor changes in design which are indicated on the drawings.

The Burlington Refrigerator Express Company is also building at its Plattsmouth, Nebraska, shops 75 Preco fan-equipped refrigerator cars of the same general design as the cars of the other companies except that vertical-grain fir siding is used instead of plywood sheathing.

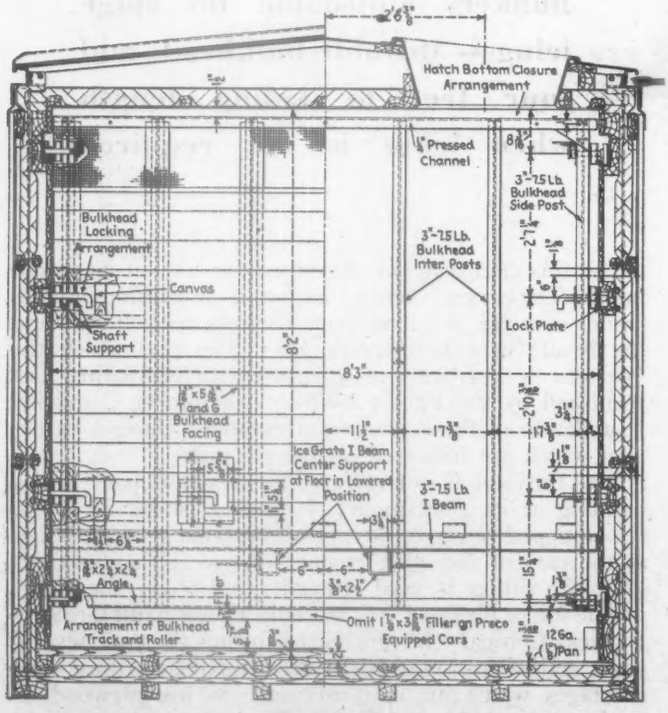
The use of plywood for cars built by the Fruit Growers Express Company has increased during the past several years and its use was further accelerated by critical steel shortages which made it necessary to use plywood or lumber as outside sheathing. The plywood has proved to be a satisfactory material for such an application although it cannot be said to have replaced steel or other



One method of application of the Preco fan assembly—The cars now being built provide for a separate fan housing covered with a floor rack section between the fan and bulkhead

materials which will be more freely available again after the war. At the present time the cars are built, using plywood, of the exterior type representing the ultimate in moisture resistance, with a 3/8-in. ceiling, a 3/8-in. thickness under the floor pan, a 7/8-in. top floor and 9/16-in. side sheathing. The sub floor is made of square-edge common grade lumber. The inside lining and bulkhead facings are 25/32-in. by 5 3/16-in. tongue and grooved, B and better lining lumber. Floor racks are of the conventional wooden type.

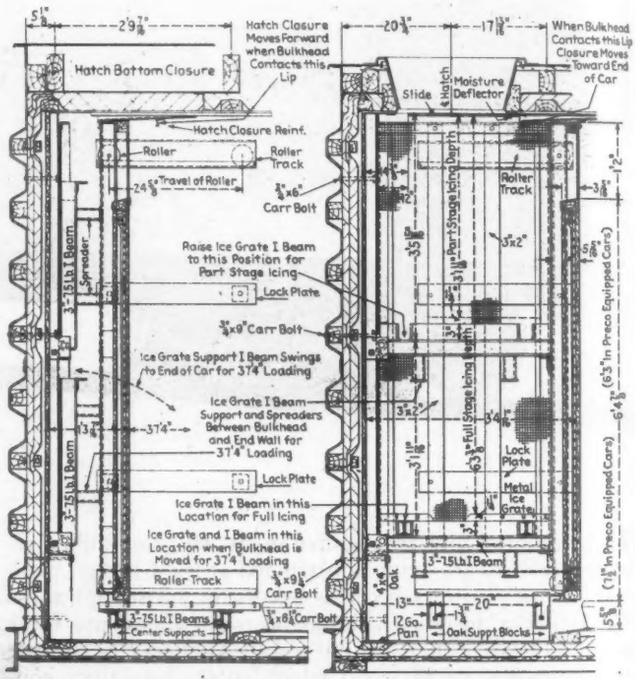
The use of welded underframes in freight cars is becoming increasingly common and this manufacturer has found it a particularly valuable method of fabrication both from the point of view of shop output and a considerable decrease in necessary car maintenance. Parts are assembled in five operations on jigs designed to hold close tolerances and to permit welding of all parts in a downhand position. Recent labor shortages have resulted in the employment of a number of women welders who have performed satisfactorily and whose output compares favorably with that of more experienced men formerly employed on center-sill assembly. The fact that all work is positioned enables them to give a maximum of satisfactory work with a minimum of fatigue. When the present order is completed, 700 cars will have been built with the all-welded underframe.



Collapsing the bulkheads adds 4 ft. 1¼ in. to the loading length of the cars—The bulkheads roll on tracks in the car sides and are locked in position in either the open or collapsed locations

Adjustable Ice Bunkers

Since stage icing is desirable in the transportation of certain commodities and full bunker depth is not required, the design of these cars incorporates adjustable ice bunkers which permit the use of the cars, with relatively simple adjustments, in either fully-iced or stage-iced service. The ice grates are supported on I-beams which, when at floor level, allow a full-stage icing depth of 6 ft. 3 3/8 in. Other I-beam supports are located so that they may be lowered and hold the grate to limit the icing depth to 3 ft. 1 11/16 in.



The cars can be employed in full or part-staged ice service and in non-iced ventilated service—Details show the simple adjustments required to convert the cars for various services

In addition to the provision of the part-stage icing feature of the bunker it is also possible to employ the cars in commodity service where icing is not required. The mechanical department has developed an arrangement whereby the bulkhead can be rolled toward the end of the car to give a 37-ft. 4-in. loading length as compared to the 33-ft. 2¾-in. available when the bulkheads are in normal position. Details of the stage icing features and of the bulkhead arrangement are shown in the drawings. The ice-hatch closure arrangement has proved to be especially effective in preventing the entrance of moisture or foreign matter, when cars are used in services where the bulkheads have been moved to allow capacity loading of commodities which do not require refrigeration. Experience with the use of this bulkheading arrangement has also shown it to be one which can be readily adjusted by workmen not previously acquainted with it. Directions are painted on the face of the bulkhead which indicate the steps to be followed in moving it in either direction.

(*Continued on page 263*)

Mechanical Division Holds

Annual Meeting at St. Louis

After a lapse of three years since its last full-member meeting, the Mechanical Division, Association of American Railroads, will hold its twentieth annual meeting on Friday and Saturday, June 23 and 24 in the Gold Room of the Jefferson Hotel, St. Louis, Mo. On Friday, the meeting will convene at 9 a.m. and adjourn at 5 p.m. The Saturday session will also convene at 9 a.m. and will continue until the program is completed. The Railway Supply Manufacturers' Association will tender a luncheon to members of the Mechanical Division at the Jefferson Hotel on Friday noon.

Following the opening exercises and addresses, the reports of 13 standing committees will be presented and discussed. In the convention calendar it is suggested that the committees limit themselves in the presentation of their reports to a brief summary of their principal features. The convention calendar also states that a Committee on Subjects will be appointed by the chairman at the opening session on Friday, June 23, to receive questions for discussion from the members. This committee will determine whether such questions are ones suitable for discussion and, if so, will report them to the Division at the proper time for discussion by the members. Members are requested not to start discussion on subjects at the session of the meeting which have not first been referred to the Committee on Subjects.

◆

FRIDAY, JUNE 23

Address by R. C. White, chief operating officer, Missouri Pacific

Address by C. H. Buford, vice-president, Operations and Maintenance Department, A. A. R.

Address by Dr. Clyde Williams, director, Battelle Memorial Institute and research consultant, A. A. R.

Address by Acting-Chairman R. G. Henley, general superintendent of motive power, Norfolk & Western

Action on minutes of the last annual meeting

Appointment of Committee on Subjects, Resolutions, etc.

Unfinished business

New business

Report of General Committee

Report of Nominating Committee

Discussion of reports on:
- **Lubrication of Cars and Locomotives**
- **Brakes and Brake Equipment**
- **Couplers and Draft Gears**
- **Geared Hand Brakes**
- **Locomotive Construction**
- **Further Development of the Reciprocating Steam Locomotive**

SATURDAY, JUNE 24

Discussion of reports on:
- **Arbitration**
- **Prices for Labor and Materials**
- **Specifications for Materials**
- **Tank Cars**
- **Loading Rules**
- **Wheels**
- **Car Construction**

TROUBLE ON THE LINE

by
Walt Wyre

"No, Red, I'm not joking and a 'come-along' is not a whistle used to attract girls," Ned Sparks, perched on a pole, yelled partly to make himself heard and partly from exasperation. "Now will you go to the electric shop and bring me a come-along?"

"Well, you needn't yell, and how am I to know when you are kidding—like yesterday, when you told me to get a conduit stretcher!" Dell Malone, Sparks' red-headed lady helper yelled back at Sparks. "Now if you are not kidding and will tell me what a come-along looks like, I'll go get it."

"Never mind!" Sparks wrapped the number six wire he was holding around an insulator and started down the pole, faster than usual. About eight feet from the ground his left hook struck the head of a large nail someone had driven in the pole and he "burned" the pole the rest of the way down.

"There's no use losing your temper and breaking your neck just because I don't know the names of all the gadgets electricians use," Dell snapped. "Now tell me what a come-along looks like!"

"I'll get it." Sparks stooped and began to unfasten his climber straps. "We will need a johnny ball for the guy on the last pole, and there would be another argument if I told you to get it."

"Maybe my brother was right when he told me that helping electricians wasn't any job for a girl," Dell said, "but give me time and I'll show him and you, too."

"Oh, you are doing O. K. for a girl," Sparks said and wondered why Dell didn't speak to him all the time they were walking to the electric shop.

Sparks found the come-along he wanted and showed Dell the difference between ones used for insulated wire and bare. There weren't any strain insulators in the electric shop and he sent Dell to the storeroom to get one. When she returned she said somewhat sharply, "If you had told me you wanted a strain insulator for a guy wire, I would have known what you were talking about."

Sparks and his helper started back to where they had been working. As it was somewhat nearer, they went through the roundhouse. When about half way through, Jim Evans, the roundhouse foreman, yelled for Sparks to wait a minute.

"Where are you going?" Evans asked.

"I'm running a line for the rail straightening machine," Sparks said. "They set it way the other side of the sand house and I've had one heck of a time digging up enough material. I don't see why it couldn't have been set closer to a power line."

"The derrick has a fairly long boom," Evans said. "They are in a rush to get that bunch of old rails straightened to use building a spur out to the government chemical plant and they want lights put up so they can work nights."

"Well, I don't know where I'll get the material," Sparks said. "There isn't enough wire left around here to put a door-bell in a back house."

"Yes, in the eighteen years I've been roundhouse foreman for the S. P. & W. here at Plainville, I've never seen as much work with as little material, but guess we'll have to get along until the war is over. Can't you put lights on the line you are running for the motor?" Evans asked.

"Not very well," Sparks said. "It's a three-phase 220-volt and we don't have any 220-volt lamps. I could use 110-volt lamps in series, but it isn't so good."

"Isn't that the way they are connected on the Diesel switch engine?" Evans asked. "They seem to work O. K. on it."

"There is a little difference," Sparks started to explain when the foreman interrupted him.

"Go ahead and wire them up that way," he said.

"O. K.," Sparks agreed. "Let's go, Red! Bring your come-along and come along."

The electrician finished running the line and connecting the motor that day. Next day he strung up six 100-watt lights, wiring two sockets in series so the 110-volt lamps would operate on the 220-volt circuit. Sparks had finished the wiring and was screwing the lamps in the socket when Tom Clark, a machinist helper, came up. "The wheel lathe motor is hot as mama's pistol!" Clark told Sparks.

"O. K.," Sparks said, "I'll be right with you. Red, you gather up what tools I leave and carry them to the electric shop."

"The motor has been running warm ever since we put new bearings in the lathe last week," the machinist that operated the lathe told Sparks, "but it never did get as hot as it is now."

"Are the bearings tight?" Sparks asked.

"No, not now. They were a little tight when we first started the lathe, but they have limbered up. I thought at first maybe the bearings were sticking but they are running plenty free."

Sparks tested the fuses and found them O. K., then he examined the controller contacts. One of them showed signs of having been hot and he thought perhaps it had not been making good contact and causing the motor to heat. He renewed all of the contacts and pressed the starting button. The motor seemed slightly sluggish starting but otherwise appeared to be O. K.

"Try it awhile and let me know how it does," Sparks told the machinist.

Sparks went to the electric shop and found that his helper had cleaned up the tools and put them away and was then busy sweeping the electric shop floor.

"You would now be eligible to be a Boy Scout if you were not a girl," Sparks said. "You've done your good deed for the day."

"What do we do now?" Dell asked as she carefully stood the broom business end up in one corner.

"Don't rush me!" Sparks said. "After I rest a minute I guess we might as well clean the contactors on the overhead crane controllers in the machine shop and grease the motors. Go and get a couple of sheets of fine sandpaper and some ball bearing grease."

Sparks had the tools he expected to use ready and was waiting when his helper returned.

"You take the tools to the machine shop and I'll bring a ladder," Sparks said.

As Sparks entered the machine shop door the wheel lathe operator almost collided with the ladder that Sparks was carrying. "The wheel lathe motor is hot again!" the machinist said.

"TAKE the tools back to the electric shop," Sparks told his helper. "I'll be out as soon as I carry the ladder back," he told the machinist.

"What's wrong with the wheel lathe motor?" Dell asked.

"Don't know," Sparks said, "unless the bearings are worn. I've looked at practically everything else and I don't see how it can be the bearings. There was a slight bit of play in the bearing on the drive end of the motor but a thickness gauge showed very little difference in rotor clearance at top and bottom. It doesn't look like enough to wear in the bearing to cause the motor to heat," Sparks said, speaking to no one in particular, "but I can't find anything else. Red, you go to the storeroom and see if they have a bearing. I don't want to start

"There's no use losing your temper and breaking your neck"

taking the motor down if there are not any bearings to be had."

The redheaded helper returned in a few minutes and informed Sparks that there were no bearings for the wheel lathe motor in the storeroom.

"Well, I don't believe it's bearings that cause it to run hot, anyway." Sparks scratched his head, a characteristic mannerism when trying to think. Science has not revealed whether it helps the mental processes or not, but anyway Sparks dug up a few scales of dandruff and an idea. "Get the volt-ammeter from the electric shop, will you, Red?" he said.

"You mean that doo-jigger in a long black leather case that has some wires with things that look like clothespins only they are metal?" Dell asked.

"Well, I believe you have the general idea, only the case doesn't have wires with clips."

Dell hesitated a moment trying to think of a suitable rejoinder but evidently couldn't as she left without saying anything. In less than five minutes she returned carrying the volt-ammeter.

Sparks had previously checked the voltage and found it to be O. K. He removed the wires used for voltage testing to get them out of the way, then opened the clamp on the end of the volt-ammeter and closed it around one of the wires.

"How does that show anything?" Dell asked. "It's not connected."

"Current in the wire causes a magnetic field that induces current in the ammeter in proportion to the current in the wire," Sparks explained as he checked the current in each of the three wires. "Can you take a fairly heavy cut?" he asked the machinist.

"O. K.," the machinist said, and set the lathe tool for a roughing cut on one of the tires being turned.

Sparks checked the current again. He found it to be considerably lower on one wire. "Well, I seem to have found what the trouble is, the next thing is to find where it is."

"Maybe they are not putting as much current in one of the wires at the power plant," Dell suggested.

"Might be a good idea for you to go to the office and ask them." Sparks managed to keep from smiling as he spoke, but he and the machinist both laughed after the girl had left.

"What do you suppose is causing the motor to heat?" the machinist asked when they had stopped laughing.

"Well," Sparks said, "my guess is a high resistance connection some place, could be most any place. I've already eliminated the controller contactors. Guess I might as well look at the motor connections."

Sparks removed the tape from the motor connections and found them O. K. The solderless connectors used for splicing the wires to the motor leads were good and tight with no symptoms of having been hot.

"Could the trouble be in back of that slate panel?" the machinist said, pointing to the controller panel.

"Yes," Sparks said, "it's just as likely to be there as anywhere. Guess I might as well take the back off the controller cabinet and have a look."

When the back was removed from the cabinet, Sparks thought at first that it was just some more work for nothing. All of the nuts on the copper studs seemed to be drawn up tight, then he noticed a lug that was a different color and there was what was causing the trouble. From some cause, all of the solder had melted out of the lug—could have been caused by a careless job when the lug was first soldered on the wire. At any rate, the wire was just sticking in the lug and making sufficient contact so the motor would start.

Sparks was removing the nuts that held the burned lug when Dell returned from the machine shop. Her face was almost as red as her hair and the fire in her eyes almost singed her eyelashes. "Think you are pretty smart, don't you!" she snapped. "Guess it serves me right for trying to help."

"Who did you call?" Sparks asked very innocently.

"The office of the power company and the manager said they were too busy to be bothered with practical jokers."

"They don't know anything about the lines in the office," Sparks said. "Next time call the power plant, but never mind doing it now. I've found the trouble. Wish you would go to the storeroom and see if they have a solderless lug for a number two wire."

"I'll go," Dell replied, "but if you are kidding this time, you better not be here when I get back."

Sparks had the wire scraped clean and bright when his helper returned from the storeroom and it was only a matter of a very few minutes to secure the solderless lug and fasten it in place on the stud.

"Now I guess we can make another start at cleaning the contacts on the overhead crane," Sparks said when the job was finished.

This time there was no interruption until they were up on the crane. They had just started on the hoist motor controller when a machinist yelled, "How about using the crane to take a driving box off the boring mill and put another one on?"

"O. K.," Sparks leaned over the rail and yelled back to the machinist, "if you'll take the ladder down and put it back when you finish."

"Won't we have to get down?" Dell asked.

"No, just keep your head down so it won't hit one of the iron beams overhead and bend it," Sparks told her.

The crane rumbled along almost the full length of the shop. "That's fun!" Dell said after she got over being nervous.

"Better stand over by the rail while the machinist is handling the controls," Sparks cautioned. "I'll tell you when it's time to duck again."

"What are all those big lights that don't have any bulks in them?" Dell pointed to some large reflectors.

"Those are mercury vapor lights," Sparks said. "Haven't been able to get lamps for them recently," Sparks told her. "I've been intending to disconnect the transformers and connect them for straight 110-volts and use incandescent lamps. That would be better than nothing.

When the machinist had lifted the driving box from the boring mill and placed another on the face plate of the machine, Sparks and his helper again pulled the switch and started dressing the contactors on the hoist motor controller. They had worked about ten minutes when another machinist wanted to use the crane to lift a piston and rod from a lathe. It went on like that until five o'clock and instead of going over all contactors, collector shoes, etc., on the crane as Sparks had expected to do, they only finished about half the job.

"Doesn't it kinda make you disgusted?" Dell asked when they were back in the electric shop.

"Oh, I'm used to it, but haven't got where I like it," Sparks said.

Next morning when Sparks stopped at the roundhouse office to get his work card, there was a note pinned to the card. Call the Superintendent's chief clerk, was what he read.

"The chief clerk is up in the air like a B-24," the roundhouse clerk told Sparks when he went into the office to phone.

"What about?" Sparks asked as he lifted the telephone.

"Don't know exactly," the clerk replied, "but it's something about lights at the rail straightening machine."

"That was a heck of a poor job you did putting up lights at the rail straightening machine," the chief clerk said when Sparks told him who was calling.

"Yes, but it's the best I could do with what material I had," Sparks tried to explain.

"What you did is no good at all," the chief clerk said sharply. "They didn't have any lights after ten o'clock. The men loafed around until about midnight, then went home. We want lights that can be depended on before tonight. Call me when you get them fixed."

"But—" Sparks got no further before the clerk hung up.

"Go out to the pump house where there is some electrical material and get all of the wire you can find," Sparks told his helper, "and look every place where there might be any kind of wire that would do to run a line to the rail straightening machine for lights. I'm going up there and find out what caused all of the lights to go out last night."

"I hear you had a little trouble with your lights last night," Sparks said to the foreman of the gang at the rail straightening machine.

"Yeah," the foreman replied, "they burned until about ten o'clock and the man running the machine at night decided he needed bigger bulbs in some of the sockets. He went to the storeroom and got some 200-watt bulbs. He must have got a short or something, anyway all of the lights went out."

Sparks started to try to explain that lights wired in series must have bulbs of like rating, but decided it would be a waste of time. He turned and went back to the roundhouse.

"I've looked every place I can think of," Dell told Sparks, "and here is all of the wire I can find."

"That's not half enough," Sparks said, "and I don't know where to get any more."

"Couldn't you use some of the wire in the machine shop," Dell suggested. "You know, the wire going to those lights you can't get bulbs for."

"Not hardly," Sparks said. "We'll get lamps some of these days, but wait a minute—maybe I've got an idea."

"Where are you going?" Dell asked as Sparks left.

"Back in a few minutes," Sparks said over his shoulder.

He picked up a ladder and went into the machine shop. In about ten minutes he returned carrying something on his shoulder.

"What's that?" Dell asked.

"It's a transformer from one of the mercury vapor lamps. It's rated at 400 watts. I believe I can connect it for stepping the 220-volts down to 110 for lights at the rail straightening machine. Two of them would do the job if they will work."

Sparks connected 220 volts to the high side of the transformer. The voltmeter used for testing showed 115 volts on the low side. He then connected two 200-watt lamps in parallel on the low side. They burned O. K.

It took about three hours to connect the transformers and connect the lights at the rail straightening machine.

Sparks called the chief clerk when the job was finished and told him that he was sure the lights would be O. K. for that night.

"Well, why didn't you fix them that way yesterday?" the chief clerk wanted to know.

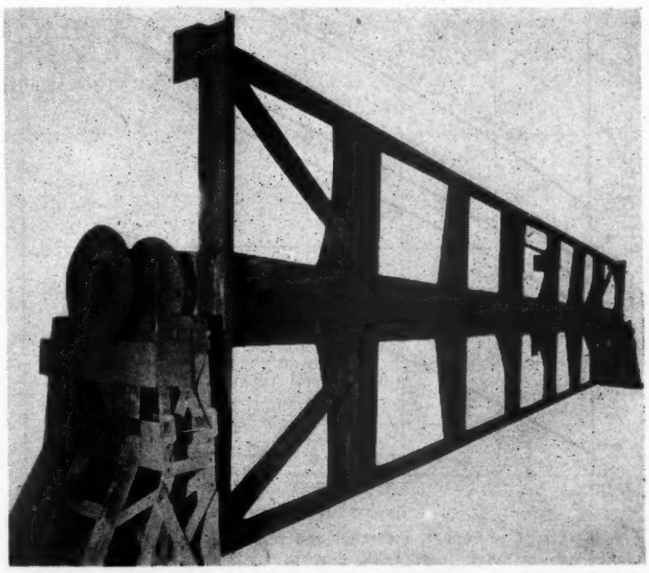
"Aw, hell!" Sparks mumbled and hung up.

Plywood Used in Forty-Ton Refrigerator Cars

(*Continued from page 258*)

Fan-Equipped Cars

Cars which are being equipped with the Preco mechanical cooling fan required that certain minor changes be made in the bunker and floor arrangements which do not, however, affect the cubic capacity of the car. Actually, this device is intended to increase carrying capacity by insuring a more even and more widely distributed flow of air throughout the entire car area thereby permitting heavier loadings than are possible in cars which depend upon convection for the distribution of cooled air. The fans are operated by means of a rubber-tired wheel which is lowered upon the car wheel. The correct pressure between the two is maintained by a coil spring. Power is transmitted from the drive shaft to the blower shaft



Refrigerator car underframes are welded in jigs which permit welding in the downhand position

by a V-belt and two pulleys. Wheel and axle ratios are such that at 30 m. p. h. train speed the fan output is 1,500 c. f. m. and at 50 m. p. h. the fan output is 3,000 c. f. m. In terms of air turnover within the car this amounts to approximately three changes per minute.

Another feature of the arrangement is that a small motor can be attached to the blower shaft while the car is standing to maintain air circulation or aid in precooling. This motor is removed when the car is in transit.

Other Details

In general these cars follow the standard A. A. R. design for refrigerator cars with the principal changes made being those which have been adopted in the ice bunkering and ventilating systems by the owners of the equipment. The trucks are of the 40-ton spring-plankless type equipped with chilled-iron wheels. Draft gears are of an approved design as are the hand and air brakes.

The cars are insulated with a total protection of 3½ in. in the floors, 3 in. at the sides, ends and doors and 3½ in. in the roof. The door opening is 4 ft. 0 in. by 6 ft. 6 in. Door headers, posts and stiles are of the rabbetted type. Ice bunkers have a total capacity of 263 cu. ft. and will accommodate 9,600 lb. of chunk ice.

The Combustion Gas Turbine

Part II*

By F. K. Fischer† and C. A. Meyer†

Closed Cycle for Large Units

The closed cycle offers a method of increasing the maximum capacity of the open cycle. The volume of the working gas is inversely proportional to the absolute pressure. If the pressure is multiplied by 10, the size

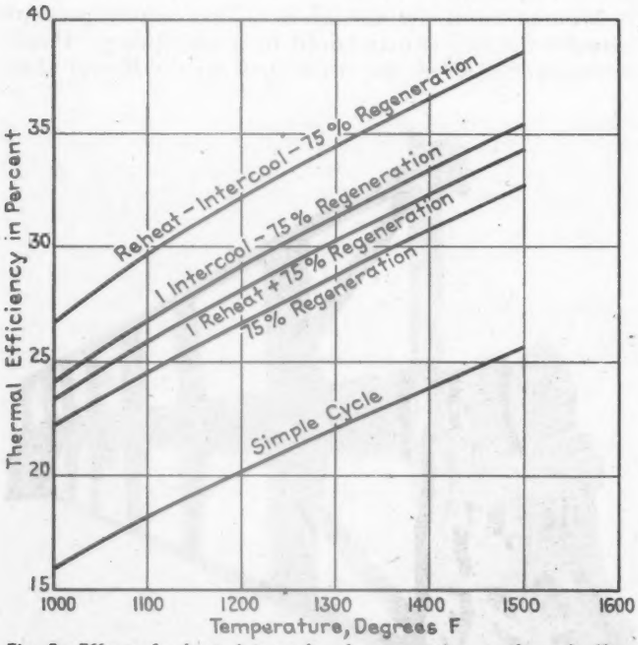


Fig. 8—Effect of reheat, intercool and regeneration on thermal efficiency over a range from 1,000 deg. to 1,500 deg. F.—Based on 70 deg. F. and 5 per cent pressure drop in regenerator—Assumed efficiencies of turbine, 85 per cent; compressor, 84 per cent; burner, 100 per cent

is divided by 10. In the closed cycle, the circulating working gas is at a relatively high pressure and reduces the physical size of compressor and turbine. To reduce the temperature of the gases before they enter the compressor, cooling water is required in the closed cycle. The heat exchanger in which the gas is cooled before it enters the compressor is called a gas precooler. The amount of heat given up to the cooling water is equivalent to that removed in the condenser of a steam unit of equal capacity. The quantity of cooling water required will be less as a higher cooling water temperature rise is permissible.

The closed cycle is shown in Fig. 11. This is an externally fired cycle in which the products of combustion do not pass through the gas turbine and compressor. The working gas (air, hydrogen or other medium) operates at a relatively high pressure in a closed, recirculating circuit. In the gas heater, the heat from the products of combustion is transferred to the working gas which then expands in the turbine to a lower pressure. The gas heater in this cycle corresponds to the steam boiler in the steam cycle. For a practical efficiency, it will be larger than the modern steam boiler because gases are on both sides of the gas heater. This cycle is very similar to the steam cycle, except that the working fluid does not undergo a change of state. As this closed cycle keeps the products of combustion out of the turbine and compressor circuit, the problem of using coal as a fuel should be much simpler of solution than in those cycles which circulate the products of combustion.

Hydrogen Has Advantages

In the closed cycle, the compressor inlet pressure will be maintained at approximately 150 lb. per sq. in. with a discharge pressure of some 600 lb. per sq. in. This high pressure greatly reduces the size of turbine and compressor and should permit maximum ratings to be built approaching those in the steam cycle. Some gas other than air will probably be used as the working medium in the externally fired closed cycle. Hydrogen, for example, has properties which make it far superior

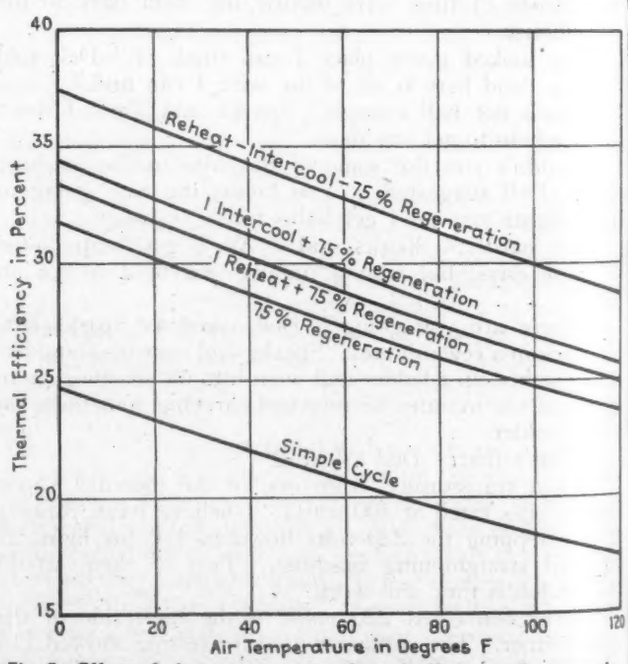


Fig. 9—Effect of air temperature on thermal efficiency of open-cycle gas turbine with 1,200 deg. F. inlet gas temperature—Efficiencies and regenerator pressure drop are the same as in Fig. 8

to air for this application. The density of hydrogen is 1/14 that of air, the specific heat is 14 times that of air, and the thermal conductivity is 6.8 times that of air.

A closed cycle system under development by Westinghouse is shown in Fig. 12. In this closed cycle a separate gas turbine and compressor are used to pump up the

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* Part I appeared in the May issue.

† Steam engineer and development engineer, respectively, Westinghouse Electric & Manufacturing Company, South Philadelphia, Pa.

cycle on which the main gas turbine and compressor operate. High pressure of around 600 lb. per sq. in. may be used with a compressor inlet pressure of around 150 lb. per sq. in. The main gas turbine and compressor would be small as they operate at high pressure. This

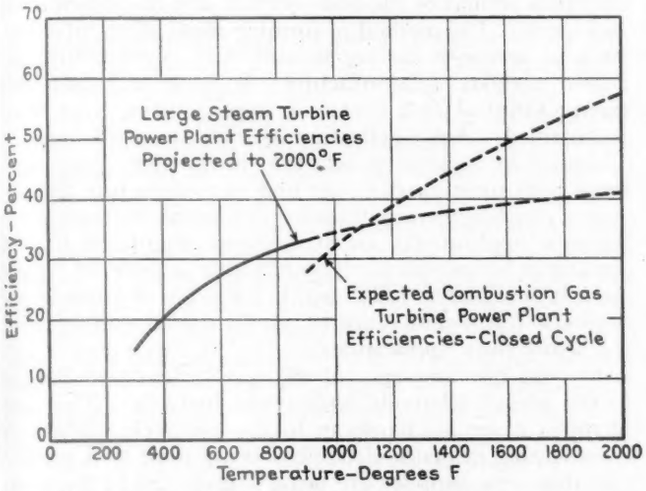

Fig. 10—Efficiencies compared for best practical steam power plants and combustion gas turbine plants

cycle is internally fired, the products of combustion passing through the gas turbines and main compressor. Enough make up air is continually supplied to maintain pressure and support combustion. It is supplied by a compressor which is driven by a second gas turbine. This cycle avoids the large gas heater required by the cycle shown in Fig. 11, but requires an extra gas turbine and compressor to pump-up the system. Solid matter from the fuel must be removed.

In the closed cycles shown in Figs. 11 and 12, reheating and intercooling are not illustrated. However, they offer the same advantage in the closed cycle that they offer in the open cycle. The biggest single additional problem in the closed cycle is a method of building practical heat exchangers. The problem is further complicated by the fact that the gases will carry foreign matter from combustion which may both corrode and erode the exchanger and reduce the heat transfer rate by depositing foreign material on the transfer surface.

Gas Turbine Control

Combustion gas turbine control can be simple and reliable, consisting only of control of the gas temperature by controlling the rate of fuel supply. Governing valves, such as used in steam turbine control, are not needed.

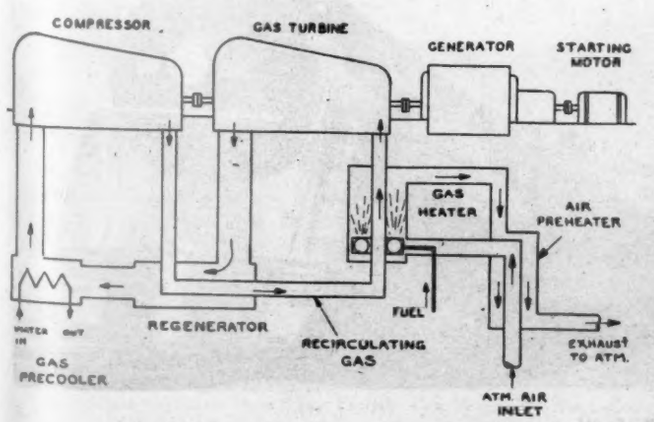

Fig. 11—Externally fired closed style

Efficient partial load performance can be obtained by using two turbines; one variable-speed turbine driving a compressor; plus a constant-speed turbine driving a generator. (See Fig. 13.) The use of regenerators, reheaters, and intercoolers in addition to improving the full-load economy, have an even greater effect in improving the partial-load economy. In the closed cycle, by reducing the gas pressure as the load is reduced, practically full-load efficiency can be maintained at partial loads.

Possible Gas Turbine Applications

The possible applications of the gas turbine are many. Ranging from a simple open cycle for small capacities to a closed cycle for very large ratings it offers wide possibilities. For example, in locomotives the simple open gas cycle requires no water. It has low weight and small space requirements combined with simplicity. With an efficiency of 20 per cent at 1,200 deg. F. and the expected low maintenance of turbine drives, it should prove a good power plant for a locomotive. The inability of the gas turbine to operate in reverse makes either electric drive or the development of a satisfactory reversing gear necessary for this application. One of the biggest problems in this field is combustion. First, Diesel oil, later Bunker C oil, and ultimately coal must be burned. The opportunities for the electric drive seem

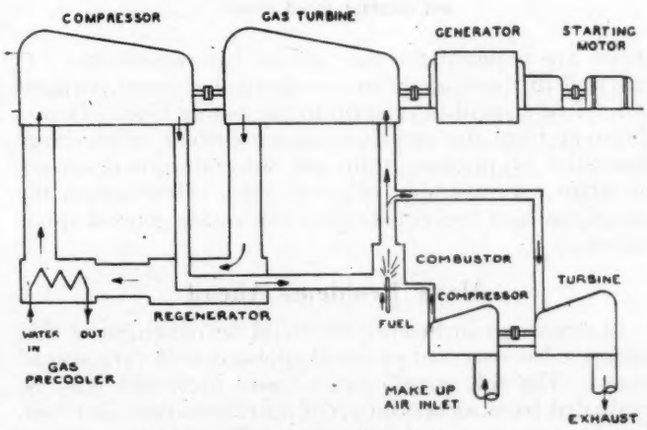

Fig. 12—Proposed internally fired closed cycle

promising. The geared drive presents special problems because of the reversing requirement.

In airplanes of relatively small power outputs the gas turbine operating at high speed and high temperature, to obtain maximum rating per unit weight of material, has real possibilities.

In ship drives the combustion gas cycle offers efficiencies equal to the best modern marine steam power plants, which have overall efficiencies of approximately 25 per cent. Weight and space requirements of equipment are a real factor in this application. The gas cycle eliminates the steam generator and steam condenser. The advantage in weight and space undoubtedly will favor the gas cycle, despite the gas compressor, the regenerator heat exchanger, and the large gas turbine. The requirement of astern operation in marine service handicaps the gas turbine, except as an electric drive.

In the power plant field general application of the combustion gas cycle will probably not take place until the problems involving the use of coal as a fuel are solved. The successful development of the closed cycle is necessary if units of very large capacity are to be built. The maximum capacity for which units can be built in the open cycle will include the majority of industrial

applications. There are many special applications in the power generation field in which the open gas cycle will possibly find early application.

In the industrial field where both power and process

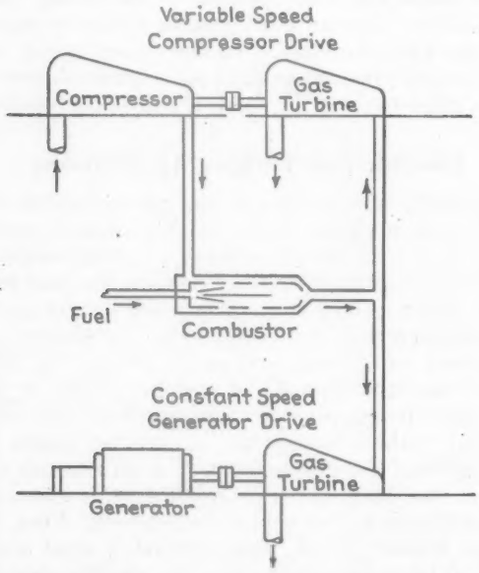

Fig. 13—Possible method of gas turbine control combining variable and constant speed drives

steam are required the gas turbine has possibilities. It fits well in those applications where the steam required is relatively small in relation to the power load. This is different from the extraction steam turbine where large quantities of process steam per kilowatt are necessary to attain a comparably efficient cycle. Here again, the use of coal as a fuel is necessary for a wide general application.

Many Problems Ahead

In drawing conclusions, it should be remembered that the cycle has only had practical application in very special cases. The full possibilities of any cycle can only be evaluated from successful proof of its economy, first cost, maintenance cost and reliability. The addition of elements which improve the fuel economy, and arrangements of the cycle for large capacities, are obtained at a sacrifice in simplicity and at a price. The development of the best system is expected to be costly in time and money.

Metallurgy plays an important part in the gas cycle as the efficiency increases rapidly with increase in top temperature. To obtain materials suitable for operation at higher temperatures the metallurgists are looking at materials similar to the non-forgable and non-machinable tool steels. The method of forming these alloys to shape, such as precision casting to size, may revolutionize accepted methods of manufacture. To apply such materials their additional first cost and manufacturing cost must be justified. Any application of such materials must be preceded by careful tests. For heavy duty apparatus these tests must extend over long periods before the designer can use them with safety. Careful differentiation between applications as to required length of life of apparatus is necessary. The fact that a piece of equipment is operated at 1,800 deg. F. for a life of a few hours does not mean temperatures of that order can be used for heavy duty applications.

Present developments of the gas turbine are limited to the use of relatively high-grade fuel oils. This one factor is a serious handicap to the gas cycle. There is considerable evidence that oil is being used at a greater rate than new supplies are being found. So in the post-war period necessity may dictate a prime mover which can use coal as a fuel. The gas cycle is definitely limited in application until such time as the problems in connection with the burning of low grade oil and coal are successfully solved.

Present research efforts are being expended in developments for the national defense. In the post-war era industry will have access to the developments in the gas turbine field and to developments in high temperature materials. These developments may considerably change present thinking. It is safe to predict that general applications of the gas cycle must wait until the post-war era.

It will be wise to watch the developments of the early installations before attempting to make widespread applications. At present, conclusions as to the ultimate possibilities of the gas cycle are little more than good guesses. The gas turbine art must advance beyond its present early development stages, before it can be judged with assurance. However, undoubtedly it will find real usefulness in a large number of fields, possibly complementing rather than competing with the steam turbine. Just how and where the gas turbine will be applied, only time will tell.

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On the Norfolk & Western

Hot Boxes, Causes and Cures*

By E. O. Dickinson†

Adherence to recommended practices and training of personnel important — Main sources of trouble known and remedies available — Wheel shop efficiency reflected in road performance

THE announcement for the meeting this evening laid great stress on the fact that during 1943, there were 135,099 set outs for hot boxes. At a first glance, this appears to be a staggering total, but an analysis of this number of set outs in relation to the national car volume and the amount of work performed makes it appear in a different light.

There were 137 Class I railroads operating during 1943 which meant that the total of 135,000 set outs was equal to 2.7 set outs per Class I road trackage or one set out per year for every three miles of track operated. The ownership of these roads during 1943 was 1,745,495 cars. Considering each car to have eight journals, it meant that approximately 14,000,000 journals were operating during 1943 and a set out occurred for every 103 journals operated for the year.

These figures tend to minimize the seriousness of the hot box situation but more so than that, reflect the wonderful work that has been done by car department forces all over the country to reduce hot boxes. In spite of the reduction we have had in the past, we all know that proper care of equipment on the part of the mechanical and transportation forces of the railroads will reduce the hot box total still more.

A 60-day check by the A.A.R. of delays to trains on account of car failures developed a total of 125,885 defects, of which only 6,203, or five per cent were due to overheated journals; 17,548, or 14 per cent were due to defective brake riggings; 26,394, or 21 per cent defective wheels; 18,137, or 14 per cent miscellaneous truck defects; 19,481, or 15 per cent draft gear underframe, a total of 87,763, roughly 69 per cent. The remainder included air brakes, safety appliances, etc. The hot box total, it can be seen, was relatively small in comparison to other causes.

It is claimed the average cost is $40.00 to set out a car along the line of road. This includes all delays involved. In addition, it is often necessary to send a man to an outlying point to make temporary repairs before movement to a shop or repair track is possible. This results in delay to a customer's shipment which may be of an important nature in connection with our present national emergency.

Many conditions, either singly or in combination, are responsible for hot boxes on both passenger and freight equipment. The A.A.R., through the Mechanical Division has made extensive studies of the hot box situation, and on July 21, 1943, issued Bulletin D-2341 which very completely covered the situation, and in so doing, outlined five important factors covering the general underlying causes and the prevention of hot boxes on railroad equipment. They are:

1—The present standard A.A.R. journal box assembly properly put up originally, maintained and serviced will carry the rated loads at present day speeds without developing hot boxes. This is amply evidenced by the every day record of millions of such boxes running to the relative few developing hot boxes.

2—The cause of a hot box is a progressive overheating of the bearing and journal due to some abnormal condition.

3—There is no single readily applicable means for the elimination of hot boxes; their reduction to a minimum can only be brought about through cooperative effort of transportation and mechanical forces to locate and correct the cause or causes of overheating.

4—The principal sources for overheating are: (a) rough handling, particularly on humps and in classification yards, (b) improper repairs or servicing; (c) mechanical conditions of equipment running gear and journal box parts; (d) wheels being continued in service which should be removed under A.A.R. Symbol 73, out of round or worn through chill and, (e) lubricating failures, loss of oil or interruption in the continuity of its feeding to journal.

5—The correction of these abnormal conditions can only be brought about by continuous follow-up at shops, on repair tracks and in yards and terminals to insure the maintenance of equipment in proper mechanical condition and to prevent lubrication disturbances originating in improper handling and servicing of equipment on repair tracks and in make-up and classification yards.

Trouble Points

The A.A.R. in analyzing the situation realized that there were six specific points involved in railroad operation where particular care should be exercised in order to minimize the possibility of hot boxes occurring. They are at the car builders or owners shops, in the wheel shops, on the repair tracks, in the classification yards, particularly hump yards, at the terminals and other crew change points, and on line of road.

Shop inspection should include the following steps: check tram of axle centers, on freight equipment match tram of side frames; check trucks for alignment; check roofs of boxes for proper wedge seat surfaces; check boxes for oil retention; check dust guard walls and dust guards; and, check box lids, hinges, spring, box face fits.

At the wheel shops on new and repair work, we should: match wheels on axles for tape size; check the wheel bore with respect to the periphery; mount wheels properly with respect to spacing to journals; and, check all cut and overheated journals for circumferential heat cracks *after refinishing:* In case where journals have been sufficiently hot to show discoloration, magnaflux for cracks and scrap any suspicious axles.

* An address delivered before the Eastern Car Foreman's Association at New York on May 12, 1944.

† General foreman, C. R. R. of N. J., Ashley, Pa.

On the repair tracks at the outside points, the greatest of care should be exercised, and the following three items will do much to alleviate your own troubles both on the track and on the line or road: comply with the present A.A.R. rules governing minimum requirements with particular attention to thorough cleaning of the interior of boxes, including the inside of lids and the mouth of box, before repacking and avoid overpacking of boxes; supervise to insure the quality of workmanship; and, inspect journals to see that they are clean and smooth. Rough or cut journals must be replaced and journals showing evidence of overheating to the extent of requiring reconditioning must be replaced with journals in good condition.

In classification yards, particularly hump yards, the transportation department can do more to wreck the mechanical department's hot box performance record than in any other part of the railroad operation. Today, with a large number of inexperienced employees manning our yard switching power, we can expect a certain amount of rough handling. When you begin to notice an increase in a number of impact defects that are being discovered by your inspectors, you know that your yard forces are setting up all of the conditions conducive to an increase in the number of hot boxes that will occur in trains originating from your yard or particular operation. When you begin to see an abnormal number of upset couplers, back strikers sheared out, shifted loads and other indications of heavy impacting, then is the time to get after your yard force and demand fairer handling of equipment. The A.A.R. outlines the following two points for particular checking in such localities: rough handling and inspection of all boxes after cars have gone over the hump. They should be inspected closely for waste grabs and jacked and repacked when it is necessary. This is important if hot boxes due to waste grabs are to be reduced.

At terminals and crew change points, the mechanical department and car department usually get an opportunity to go over their equipment and all boxes should be checked immediately after a stop is made for unusually warm journals. All such boxes should be inspected for lint or waste strands under bearings and jacked and repacked if necessary. At interchange points, inspection and servicing should be performed by the delivering line wherever it is practicable and free oil should be added to all boxes where a dry condition of packing exists, particularly during the summer months.

On line of road, the train crews themselves can do much to lessen the number of cars that are set out for hot boxes and, at the same time, minimize the amount of damage that may occur. Rough handling and break-in twos must be avoided, constant watch must be kept to detect overheated journals and coolants should be used until a repair point is reached. All boxes thus temporarily serviced on line should be jacked and repacked at the first repair point.

Waste Grabs

The primary cause of over 70 per cent of hot boxes is the well-known waste grab. Waste grabs are caused by rough or unusual handling of cars in transportation yards, irregular track surfaces, journal packing placed in to the journal box in too great a quantity, packing applied too tight and, a lack of sufficient lubrication. There may be other causes, but these are considered the most important.

An impact at a speed of more than four miles per hour will raise and may displace journal bearings. It also may distort the journal packing. Periodical repacking of journal boxes should conform strictly to all the provisions of Rule 66 of the A.A.R. Interchange Rules. In connection with Rule 66, Paragraph B, the last sentence reads: "Missing or defective dust guard plugs shall be renewed."

Packing must be prepared in accordance with A.A.R. specifications. Three factors conducive to good practice are: a more general practice of delinting new and renovated waste prior to making it up into journal box packing; a more general practice of mixing new make-up waste to renovated waste of corresponding grades at renovating plants and, since a number of roads are experimenting with devices to retain packing in place, attention is called to them with the suggestion that such devices, when found to be in serviceable condition, be replaced whenever journal box attention necessitates their removal. However, the use of loose wooden sticks as packing retainers on freight cars is not encouraged.

Repacking of journal boxes and inspection of journal bearings and wedges require experienced and well-trained employees. New employees usually do not have the mechanical background to handle such operations effectively. It is, therefore, necessary that their supervisors take the necessary time to train such employees and, after the training period has been completed, frequent checks must be made to see that these employees are following instructions and standard practices and not introducing their own ideas as to how boxes should be packed.

Packing Practices

Waste should be placed into a box in one solid mass as nearly as is possible and kept at least one inch below the center line of the journal and back of the collar. It is vitally important that all ends be turned under, with no short strands along the sides of the box. The packing should be placed in the box firmly, but not too tightly. Packing applied to tightly will become glazed by journal contact and retard the flow of oil being syphoned from the bottom of the box. This will also permit the packing to adhere to the journal or become lodged against the outer edge of the bearing.

Free oil should be applied to all boxes that show any signs of dryness. An extra amount of free oil pays large dividends and is cheap insurance. Extensive studies by the A.A.R. during the past year with respect to the relation of packing dates to hot boxes show that there are large numbers of hot boxes developing during the first nine months off repair tracks, many on cars within one to three months from the stenciled date of packing. This indicates either that the work is not being carried out in accordance with the rules or the application of parts and materials not meeting A.A.R. standards.

Uneven bearings are responsible for a large number of overheated journals. They may be caused by unmatched side frames resulting in improper alignment of the truck, worn journal bearing wedges, and worn crowns in journal boxes. Improper trueing of journals at the wheel shop will also cause overheating, especially under heavy loads or other adverse conditions.

Wheel Shop Practice

Too often, wheel shop practice is not related to road performance, yet the two are very closely allied. In a great many instances, some wheel shop employees believe that their personal machine practices are superior to the practices promulgated by the A.A.R. and cov-

ered in the Wheel and Axle Manual. The Wheel and Axle Manual was assembled with a great deal of care and, while it is possible that individual wheel shop employees may have good ideas, the majority of ideas that are not in conformity with the Wheel and Axle Manual will lead to difficulties on the line of road.

Axle lathes must be maintained so that the centers are in proper alignment. Wear between the ways and tool carriages must be minimized so that machining of axles may be truly concentric and without taper or chatter. Spindle bearings, etc., must be renewed when necessary to insure accurate turning. Lathe centers must be reground or renewed when showing signs of wear or gouging. Axle lathes should be inspected and checked once each week when they are in constant use and when irregularities are discovered they should be corrected.

Worn driving gears on axle lathes prevent the true and symmetrical meshing of the gear teeth. Worn teeth result in an impact or blow being struck by the pinion, and rather than a smooth even cut being taken, a chipping action occurs. This drawback in wheel shop practice is being largely overcome in the more modern designs of wheel lathes. There are at present being marketed car wheel boring mills, and mounted and unmounted wheel lathes on which hydraulic drives are used. This type of drive is most desirable as it can give nothing but a smooth, continuous driving action and the general installation of this type of machinery in railroad wheel shops will do much to insure true journals and wheel seats.

The finished journal should be like polished glass in appearance and feeling. Ridges and corrugations in the journal fillets made during machining or due to wear may lead to breakage and should be machined out in the lathe. The finish machine cut should leave a surface free from ridges, streaks, burrs or chatter marks. The rolling also must be properly done. In no case should a file be used on the journal surface or fillets. Filing a journal, which it is either rotating in a lathe or at rest will cause low spots, streaks, or out of round conditions which will surely lead to trouble. The only legitimate use for a file on an axle is to break the sharp edges of the end collar or the dust guard seat. Journals should never be ground with a coarse abrasive or polished with emery under heavy pressure. Streaks, scratches and some taper may result and the abrasive, or its product, is apt to fill up the pores of the steel and remain there to contribute to hot boxes.

Polishing may be done either with 00 abrasive flour in oil applied by hand pressure only or with 00 abrasive cloth which is free from ridges, selvage, etc. Plenty of oil should be used and the rubbing block must be hollowed out to fit the journal. In the latter case, only light pressure should be applied.

Rolling journals to a finish should be done with a hardened steel roller having a contact face similar to the shape of the lathe tool. The roller should be set flat against the journal surface after first cleaning off all grit and chips by flushing with thin oil. During the rolling the journal must be coated with a suitable oil. It is very dangerous practice to roll over any corrugations, ridges, or rough surfaces, especially in the journal fillets as rolling such projections down into the metal is liable to lead to breakage. Such projections must be removed by a machine cut before the roller is applied. Rusting on a finished journal may start within the hour after turning and quickly eat into the surface. Therefore, the journal should be coated immediately with a rust inhibitor which will not wash away or wipe off easily.

We are now entering the critical time of the year with respect to hot boxes. The months of June, July, August and early September are most critical. The annual seasonal increase in hot boxes during periods of continuous hot weather is attributed to the narrowing of the margin between maximum running and critical bearing journal temperatures. Additional frictional heat at any given box location, due to some abnormal condition, is the margin between the box running or the development of a hot box. For this reason it is essential to take extra precautions to eliminate abnormal frictional conditions within all journal boxes, *in advance of periods of continued hot weather* as insurance that they will run during the hot months.

The journal box, journal box lid, and side frame manufacturers have a distinct responsibility in combating hot boxes. While its use may still be controversial I believe that there is much room for the development of ventilated journal box lids manufactured in a price range that will make their application to freight cars possible and practicable. There are many instances where journals have been found which have had an internal heat high enough to melt the anti-friction lining. Had the journal boxes, either detachable or integral with the side frame, been equipped with fins, or corrugations to provide additional exposed exterior heat-radiating surfaces, it is entirely possible that a great number of hot boxes would not have become serious enough enroute to cause complete failure. This or some similar improvement would be welcomed by the railroads' mechanical personnel. It is known definitely that the majority of overheated journals can be eliminated by proper maintenance of the equipment with inspection forces being properly trained by their immediate supervisors. Efficiency and performance depend almost entirely upon training of the employees and giving them a sufficient time to perform work properly.

After the forces have been properly educated, the best place to discover any irregularities is at any inbound inspection. During this inspection, particular notice should be given to dry centers of the journals. All journals running above normal heat should be jacked and the bearings and wedges should be examined for defects. All journal boxes requiring resetting of packing can be worked at this time with free oil being added where necessary.

The car foreman who is constantly trying to improve his hot box situation generally attains some degree of success and, although discouraging factors may creep into the picture, perseverance and hard work will generally be rewarded by some gratifying results. While the hot box performance in the past has been creditable and is steadily improving, everything that we can do at this time to minimize the delays in trains getting over the road will materially aid the war effort, as there are few trains today which do not include in their consist men or material definitely connected with the war effort.

GLASS blocks for enginehouses are finding favor on the New York, New Haven & Hartford. In the interests of modernity, but mainly for economy, the railroad has replaced ordinary glass windows in four of its enginehouses with the newer glass bricks. It is expected this will appreciably reduce maintenance expenditures on the old glass, which always had run into a major figure. Similar treatment is being considered for the Providence and East Hartford enginehouses and shop buildings at Readville. The bricks, it is said, afford maximum distribution of light.

EDITORIALS

The Telegraph And the Railroads

On May 24 the one-hundredth anniversary of the first practical application of the telegraph was celebrated. On May 24, 1844, Samuel Finley Breese Morse, an American artist of note who knew comparatively little about things mechanical and electrical, saw his fondest dream come true when he sent the now historic first telegram—"What hath God wrought."

Actually, an event which occurred on the Baltimore & Ohio on May 1, 1844, gave the telegraph the attention which caused its recognition and adoption. After trying for twelve years to convince the public of the value of his idea, Morse succeeded in obtaining $30,000 from Congress for the construction of a telegraph line to be run from Washington, D. C. to Baltimore, Md., and Louis McLane, president of the Baltimore & Ohio, seeing the possibilities of the telegraph as an aid to railroad operations, granted Morse permission to use the railroad right-of-way.

On May 1, when the telegraph line had been completed from Washington to Annapolis Junction, Md., a distance of 22 miles, Washington was awaiting the news of the Whig presidential nomination which had been made in Baltimore. Delegates returning from Baltimore were bringing the news by train. When they arrived at Annapolis Junction, Morse's co-worker Vail got the news of Henry Clay's nomination for president and flashed it to Washington over the new telegraph line. The delegates were surprised when they arrived in Washington and found the news was already known. By the time of the opening of the completed telegraph line—May 24, 1944—the publicity given the May 1 episode had established the event as the big news of the day. As a result, many were impressed with the potentialities of the telegraph.

From that day on the railroad and telegraph industries have been closely associated, and today most of the telegraph lines in the United States follow railroad rights-of-way. The railroads recognized the value of the telegraph from the beginning since a rapid method of communication was needed for dispatching trains and quickly forwarding other railroad intelligence. The telegraph was first used to operate trains in 1851 on the Erie. In 1861 the first transcontinental telegraph was completed and the Pony Express, just sixteen months old, was discontinued. The third, and first successful Atlantic cable was laid in 1866. The first trans-Pacific cable was laid in 1903.

In 1876, the telephone appeared as a development of the telegraph by Alexander Graham Bell, and in 1897 Guglielmo Marconi succeeded in sending a wireless telegraphy message across the English Channel.

Today, modern telegraphic equipment is, in the main, automatic. The received messages are automatically recorded on paper tape or in printed form; and, in spite of the development of the wire telephone and radio telephone with their ability to transmit and broadcast the voice, the telegraph continues to maintain an increasingly important role. As is the case with the teletype, messages are sent by the teleprinter by operators who write on keyboards similar to those of typewriters. Hundreds of messages can be sent simultaneously over a single pair of wires by means of the Carrier system. For many reasons—because of its accuracy and speed—because it can be used easily to make a printed record—because written messages can be relayed without the sender waiting to do his own sending, etc.—it is evident that this hundred-year-old invention of a painter, fostered by the railroads, will long continue to serve man's need for transmiting intelligence.

The Mechanical Department Suffers from Labor Shortage

Especially in some sections of the country, maintenance work on both locomotives and cars is being seriously restricted by shortages of manpower from causes associated directly or indirectly with the nation's war effort. While the greatest need is for unskilled labor, experienced craftsmen and helpers are only slightly less in demand. Mechanical manpower shortages reported as of April 1 are somewhat greater than on March 1 and considerably larger than a year ago. They are most critical on the West coast, less serious in the Middle West and Southwest with only occasional shortages reported in the Northeast and Southeast.

Figures submitted by individual railroads to the U. S. Railroad Retirement Board show increased needs for manpower in practically all classes of mechanical department work. The greatest deficiency is in shop laborers, there being a shortage of 5,781 on April 1, as compared with 4,650 on March 1 and 2,406 on June 29 last year. The reported needs for skilled craftsmen and helpers as of April 1 are as follows: Machinists, 3,842; machinist helpers, 1,435; car repair men, 3,088; carman helpers, 1,690; boilermakers, 1,186; boilermaker helpers, 785; blacksmiths, 177; blacksmith helpers, 123; coach cleaners, 697; painters, 474; pipe fitters, 262, sheet metal workers, 307; welders, 145; apprentices, 1,032. In practically all of these categories, the reported shortages on April 1 were somewhat larger than in the preceding month and substantially greater than a year ago.

The total shortage of railway employees engaged in maintenance equipment work is at least 10 per cent. In some instances, this has actually delayed individual

car and train movements, but evidence that deferred maintenance has not yet seriously restricted railway operations is afforded by the records of constantly increasing car-miles and ton-miles of traffic handled. Present mechanical-department labor shortages would doubtless be much larger than the figures quoted except for the following measures adopted by the railroads over a year ago to develop special training programs for supervision as well as shop employees; to institute campaigns against absenteeism; to transfer repair work from road to road; to change the age limits for employment; to re-employ pensioners in certain instances; to employ women to an increasing extent; to employ Mexican labor.

A concise analysis of mechanical department labor conditions and requirements, up to and including the first two months of 1944 was developed by the Association of American Railroads in conjunctions with the Office of Defense Transportation and submitted to the War Manpower Commission and the Selective Service System. As indicated in this report, one of the best indications of the increased demand for equipment maintenance is the miles run by cars and locomotives. Total car-miles increased 53 per cent between 1939 and 1942 and total road locomotive-miles increased 33.5 per cent during the same period, the average of the two, on an equal weighting basis, being 43 per cent. During the same period only 33 per cent more workers were employed in maintaining equipment. Further increases of 6.8 per cent in car-miles and 7.8 per cent in locomotive-miles between 1942 and 1943 averaged 7.3 per cent. Employment increased only 6.4 per cent, necessitating a further increase in average hours of work from 48.8 hours per week in 1942 to 51.0 hours per week in 1943.

The report showed that on January 1, 1944, the railroads had 374,000 maintenance of equipment employees, but were approximately 30,000 employees or eight per cent short of their needs. Notwithstanding this shortage, plans called for the drafting of 20,800 equipment maintenance employees in the first half of 1944 compared with actual inductions of 10,300 during the preceding six months. A table covering ten labor classifications on 27 Class I carriers, included in this report, indicated that, as of January 1, 10,020 workers were needed in these ten classifications; 39,376 were already in the armed forces; 5,576 were inducted in the first half of 1943 and 11,158 were scheduled for call in the first half of 1944.

There is no doubt that the lack of adequate manpower for maintaining equipment was and still is slowing down repair work on cars and locomotives. Some roads are experiencing difficulty in turning locomotives promptly, with the result that trains ready to move are being held awaiting power. Trains are also being delayed owing to inability of the railroads to inspect and repair freight cars promptly with the forces now available.

An analysis of statistics showing the miles run out of locomotives during the month and the miles restored through repairs indicates that the railroads are losing some ground in locomotive maintenance work and doubtless the same relative conditions obtains with respect to freight-car maintenance. For the last four months of 1943 the number of locomotive miles run out exceeded those restored through repairs by the following percentages: September, 3.4 per cent; October, 3.6 per cent; November, 4.7 per cent; December, 11.1 per cent (preliminary figure). Maintenance of equipment employees averaged 51 hours of work a week in 1943, compared with 48.8 hours in 1942 and 45.6 hours in 1939. The work week of such employees is now among the longest in the country.

Equipment and Tools For Better Car Repairs

Recently the head of a car department informed us that his salvation during the war years insofar as manpower was concerned had been in the purchase of numerous hand tools of modern design, of various car and journal jacks and of other items which contributed to the efficiency of operations at car-repair points. During these years his total expenditures had approximated $75,000 and he was satisfied that in the last two years the tools had more than paid for themselves in making possible the performance of work which prevented the piling up of bad-order cars or cars requiring rip-track attention. He expects to continue with his tooling program until the time when he can feel reasonably satisfied that every point on his system had an adequate number and variety of the tools and accessories which contribute to the speedy, efficient and labor-saving release of cars requiring repairs.

On another system recently it was also found that a comparatively minor investment in a concrete runway, new jacks, hand tools, material trucks and crane trucks, had made it possible for an important car repair point to cope with exceptionally heavy wartime traffic without delays to car movement. This repair point is located at what practically amounts to a bottleneck for traffic movements and any delays in the release of cars requiring repair attention would have affected the entire system seriously. On this road too there is a keener appreciation now of the value of such installations and its planning includes the extension of these modernizing influences to points which are not yet fully equipped.

For a number of years it has been recognized by the Car Department Officers' Association that car repair points offered a fertile field to be cultivated in the interest of better car maintenance. It is, however, only within the past several years with their serious manpower situation that much has been done to bring such points up to a level of efficiency that might long ago have been obtained by the application of the ideas now being employed. It now appears that the day of the back-straining, "hard way" methods of doing work is on the way out and that we may look hopefully to the time when at least all of the more important car points will be equipped with facilities and tools which pro-

vide the workmen with an opportunity to do good work quickly and well at a considerable saving in the expenditure of physical energy and time.

Another Record in Locomotive Operation

Several times, in the past two or three years, it has appeared that the limit of capacity in freight motive power on American railroads had been reached only to discover, when some subsequent monthly operating statistics came in, that another temporary high mark had been established.

The indicator used in these estimates of ultimate freight locomotive capacity is that of the percentage of active locomotives to total locomotives. Back in 1929 the peak traffic of October required the use of 75.3 per cent of the freight locomotives to handle 110 billion gross ton-miles with 64.7 million locomotive miles. This was looked upon as a high mark in freight operation. Ten years later we still had not found a way to use more than 80 per cent of the locomotives in spite of the fact that the inventory of freight power had dwindled by more than 6,000 units.

After we really got into the job of handling war-time traffic with limited numbers of locomotives, as well as other equipment, we established a new top mark of over 80 per cent and by October 1942 the use of freight power had reached the high figure of 87.8 per cent.

Now, for 20 consecutive months the percentage has varied between 86.1 and 87.0. This was the requirement for freight power to operate between 62.9 and 70.4 million locomotive miles a month in the handling of from 125 to 145 billion gross ton-miles.

The question now arises as to whether or not this consistent 20-month percentage may not represent the ultimate in locomotive utilization without substantial additions to the inventory or radical improvements in engine-terminal or back-shop facilities or methods.

The performance of the modern steam locomotives, by comparison with those of 20 to 35 years of age gives a clue to the next move in improving locomotive utilization. It also shows what must be done to put steam power in a position to compete with the Diesel and the electric locomotive. For, in almost any detailed study of the movement of motive power through terminals it will be seen that the new power, even when disregarding its greater hauling capacity, can get through a terminal and be ready for further service in proportionately less time than the older locomotives.

Terminal time represents from two to five hours of "lost" time at the end of every revenue-producing trip of a locomotive. During this time there must be inspection, fire-cleaning, fuel and water service, running repairs and intra-terminal movements. It is by shortening the time required to perform these operations that improvements in utilization can be made. In finding a way to make these reductions in time the railroads will enhance the value of their tremendous investment in motive power.

NEW BOOKS

THE STEAM LOCOMOTIVE. *Second Edition. By Ralph P. Johnson, M.E., chief engineer, The Baldwin Locomotive Works. Published by the Simmons-Boardman Publishing Corporation, 30 Church street, New York. 564 pages, illustrated. Cloth bound. Price, $3.50.*

The first edition of this book appeared in 1942 and was exhausted in about one year. Advantage was taken of the necessity for reprinting to revise the text, correcting such errors as had occurred in the first edition and to add three chapters. The first of these, on steam utilization, is a general discussion of the factors affecting mean effective pressure. The importance of free passage for the steam from the boiler to the cylinders is developed. A second chapter presents in detail the methods of calculating the location of center of gravity and the center of driver support for single-unit locomotives, with and without trucks, and for articulated locomotives as well. The methods are illustrated with examples. The third chapter which has been added deals with braking. The treatment is fundamental with respect to the forces involved in the production of retarding effect, and the discussion includes the problems of braking high-speed trains. In all, there are 29 chapters which may be divided roughly into three groups—those which deal with the locomotive and its performance; those which discuss conditions outside the locomotive affecting its performance, and those on various aspects of motive-power economics. The treatment throughout is essentially practical. In the field of locomotive proportions and performance the book contains much data and information which is directly related to modern practice.

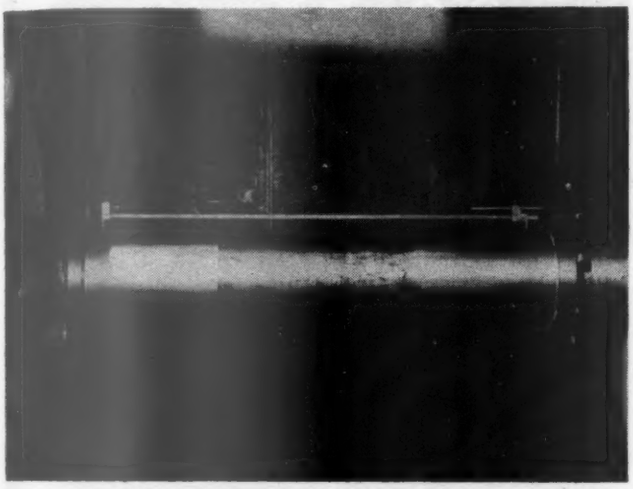
CAR BUILDERS' CYCLOPEDIA. *1943 Edition. Published by the Simmons-Boardman Publishing Corporation, 30 Church street, New York 7. 1,324 pages, illustrated. Price, $5.*

An advisory committee appointed by the Mechanical Division of the Association of American Railroads, many other railway officers, the railway car builders, and the manufacturers of railway supplies all assisted in the compilation of the 1943 edition of the Car Builders' Cyclopedia. In it have been included many of the new designs and construction details of freight and passenger cars and appliances developed in the field of railway car construction since the publication of the fifteenth edition in 1940. The Car Builders' Cyclopedia was first published in 1879 as the Car Builders' Dictionary. In 1922 it was transformed from an illustrated dictionary to a cyclopedia and the material has since been arranged and indexed so that reference to the general index, or to the table of contents, gives the location of each car or appliance, while the complete detailed index embodied in the definition section gives a reference to each specific car or part. Triennial revisions keep this book abreast of current practices in the construction of all types of railway rolling stock.

IN THE BACK SHOP AND ENGINEHOUSE

Two Wheel-Shop Devices

Two relatively simple devices for expediting driving-wheel repair operations at the South Tacoma, Wash., locomotive shops of the Northern Pacific are shown in the illustrations. A gage, illustrated at the left, is used for measuring the distance between the driving-wheel hub liners. It consists of a ⅜-in. square steel rod with



Gage for measuring the distance between driving wheel hub liners

Portable air cylinder rams for removing locomotive tires

a fixed head and adjusting screw on one end and an adjustable sliding-head on the other end having an auxiliary graduated ¼-in. square measuring bar, separately adjustable in the sliding head. When both ends of this gage are in contact with the hub liners, the distance between the liners is measured directly on the graduated scale.

The other illustration shows two portable air cylinders, equipped with rams at either end and used for removing locomotive driving-wheel tires. Each air cylinder is welded to the upper end of an adjustable pedestal stand, the base of which rests on four small rollers set so that the pedestal stand easily moves parallel with the cylinder center line. Air supply to the cylinders is secured through the hose connections indicated.

In operation, one air cylinder and a pair of rams is located on each side of the driving axle with the rams bearing against the tires at points approximately 180 deg. apart. Air pressure is applied exerting equal pressure outward against the tires, which are then heated with the usual ring-type tire heaters. As soon as the temperature has been raised sufficiently to release the tires, the rams force them off the wheel centers which eliminates excessive tire heating and reduces the time required for removing tires to a minimum.

Portable Tester for Mechanical Lubricators

The distribution systems of mechanical lubricators are tested on New York Central locomotives undergoing repairs before the locomotives are wheeled. A special test cart is used in making these tests at the West Albany shops replacing the former method of turning the lubricators over with an air-motor-driven ratchet. The cart is provided with hose connectors which are attached to the leads from the lubricators. Through a manifold on the cart the lubricator lines can be blown out with either air or steam. A valve control closes off this manifold connection when the lines are blown out and an oil tank, mounted on the cart, is opened to the manifold. Pressure is introduced into the oil tank and oil is forced through the manifold to the various lines in the lubricator distributing system. Leaks in the flexible or rigid tubing or in the dividers of the lubricator system are easily detected by workmen underneath the locomotive. The fact that this work is done before the locomotives are

Test cart employed in checking the distribution system of mechanical lubricators

wheeled aids greatly in the repair of any defects discovered. Valve controls make possible the testing of the entire system or of individual lines as may be desired.

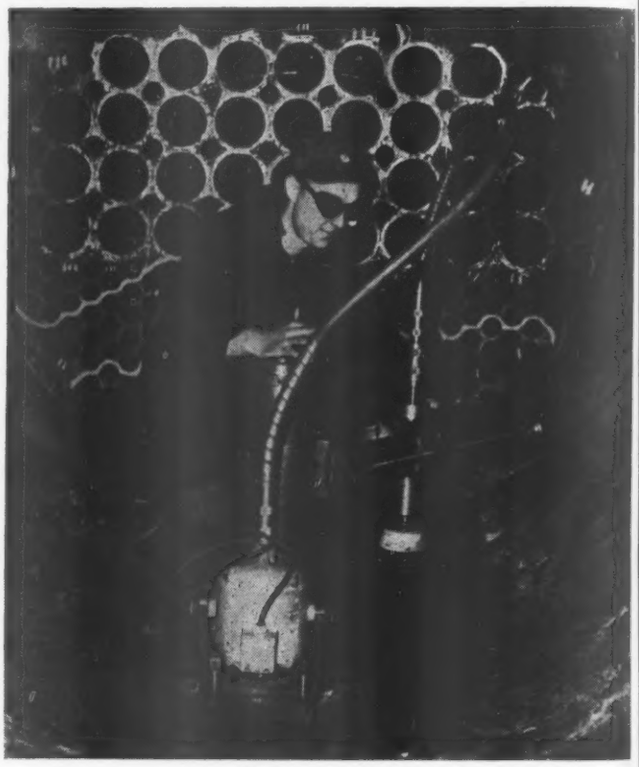
Machine for Facing Exhaust-Stand Seats

The machine, illustrated, was constructed and is being used at the Bayshore, Calif., shops of the Southern Pacific, to do away with hand chipping and spotting-in the exhaust-stand seats on locomotive cylinders. It is operated by one mechanic. The setting up of this machine is simple, no unusual skill being needed to operate it. The machine has amply demonstrated its ability to do a good job with a considerable saving in time.

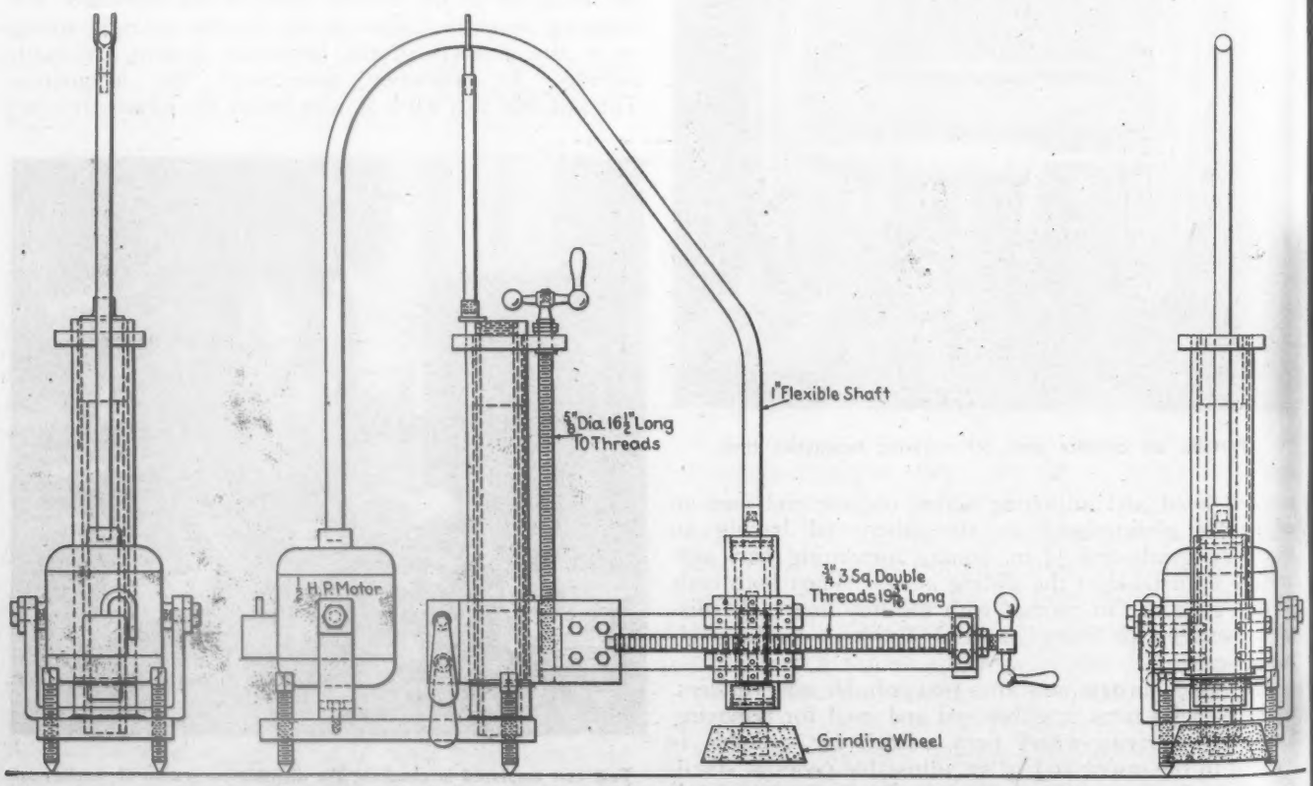
Experience shows that, after grinding the face of the exhaust seat on the cylinders (using a light finishing cut) and grinding the seat face on the exhaust-stand, no further lapping is needed. The machine can also be clamped on a surface plate large enough to support both the machine and an exhaust stand and used to grind the exhaust-stand base. It is, therefore, adaptable to grinding the steam joint seats on both cylinders and exhaust stands. After stands are bolted down on the cylinders, they are hydro-tested and no trouble has been experienced with the joint leaking.

This grinding machine is driven by a ½-hp., 110-volt, electric motor, using a 1-in. flexible shaft to drive the spindle carrying the special Norton cup-type grinding wheel. The spindle is housed in a casing having two roller bearings, one at the top and the other at the bottom. The 3-in. spindle casing is 9⅞ in. long, being adjustable vertically in the crosshead to give the large range of adjustment required to cover all classes of locomotives.

The crosshead slides on two 3¼-in. by 24-in. guide bars and gibs are inserted in the crosshead with set screws to adjust them and tighten the crosshead on the guide bars. The two guide bars are bolted to a forged and welded steel yoke capable of vertical adjustment by means of a long hand-feed screw on a bushing which revolves on the 2 7/16-in. by 23-in. steel mast, welded into the base of the machine. A cap secured to the upper



Machine developed and used on the Southern Pacific for grinding exhaust-stand seats



General arrangement of the exhaust-stand-seat grinding machine used on the Southern Pacific

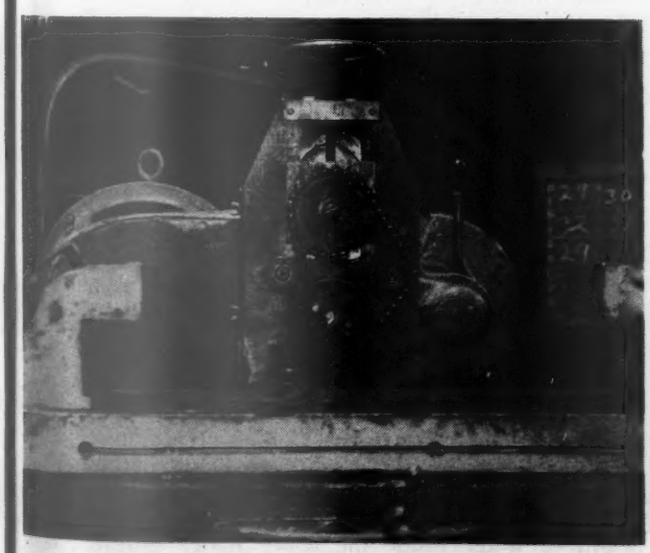
end of the bushing is also the upper support of the vertical feed-screw and the design is such that when the guide-bar yoke is raised to the proper elevation and clamped to the bushing, the entire construction, including the grinding wheel, can be rotated by hand around the central mast. Cross feed of the grinding wheel along the guide bars is provided by means of the horizontal hand-feed screw shown and can be adjusted easily so that the grinding wheel covers the entire surface of the exhaust-stand seat while being swung back and forth over it.

The base of the machine, made of a ¼-in. steel plate 7⅞ in. wide by 16 in. long, also carries the motor-support bracket which is secured to the base by two cap screws and supports the swing-connected motor on centers 6 in. above the base plate. The base plate, itself, including the motor support and mast with attached detail parts, is properly positioned at the bottom center line of the smokebox and clamped firmly in place by means of a single piece of strap iron and two studs or bolts. Four ⅞-in. adjusted screws, one at each corner of the base plate, permit easily and accurately leveling the machine before it is clamped in place. This feature is essential in order that the ground surface of the exhaust-stand seat may be exactly horizontal and the exhaust stand remain accurately vertical when applied.

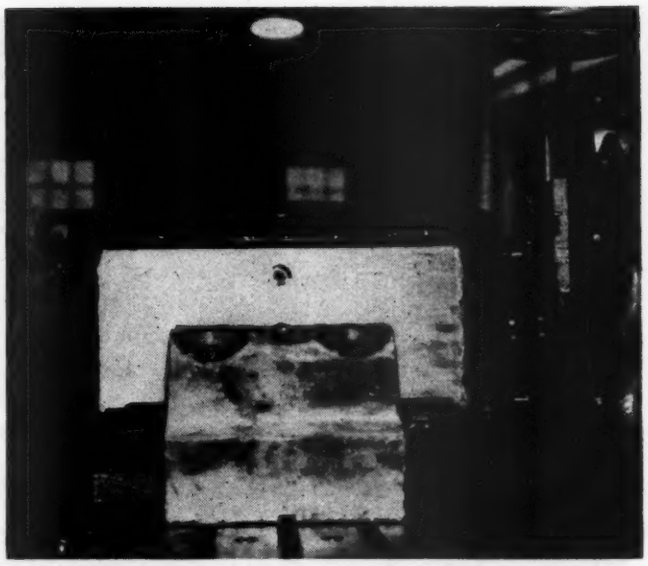
This machine was designed by J. R. Hickey, erecting shop foreman, and E. Ransom, machine foreman at the Bayshore shops. The time required for one mechanic to set up the machine and grind the exhaust-stand seat on the locomotive illustrated was 4 hrs. 20 min. It would have taken a machinist and helper considerably longer, possibly up to 10 hrs., to do this job by the old method.

Driving Box Milling Fixture

When spring-saddle seats on driving boxes of Erie locomotives become worn they are rebuilt by welding and then machined to proper size. Formerly each of the two grooves was milled out separately but, since the development of a special machine fixture, the boxes are now milled in both slots at the same time. The new fixture



The machine spindle drives the extra milling attachment through a chain and sprocket arrangement with idlers



Handwheel adjustment is provided to set milling cutters for various sizes of driving boxes

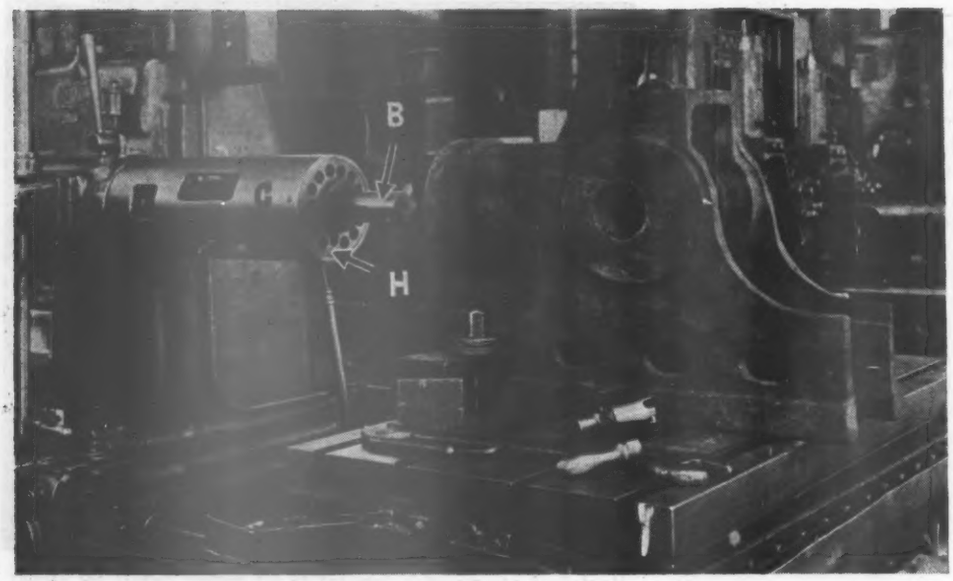
is mounted on the machine so that a second milling cutter is driven by a chain drive from a sprocket fastened to the machine spindle. Handwheel control makes possible the vertical adjustment of the second cutter to accommodate boxes of various sizes or with different slot spacings. The adjustment varies between a minimum of 8¼ in. and a maximum of 10½ in. Chain slack is taken care of by two idler wheels. Workmen at the Hornell shop were responsible for this development which has doubled the productive capacity of a machine and produces uniform results in the milling of these locomotive parts.

Boring Bar For Taper Fits

The illustration shows an ingenious and convenient tool for boring taper fits on a horizontal boring mill at the Denver, Colo., shops of the Chicago, Burlington & Quincy. The particular job illustrated on the boring mill is an underhung crosshead in which the piston rod taper fit must be machined.

The taper-boring attachment consists of a hollow steel cylinder *C*, 8½ in. in diameter by 22 in. long, which revolves when the boring machine is in operation and carries at its outer end a short auxiliary boring bar *B*, so supported in the false head *H* that, as it feeds in and out of the head and revolves with it, the tool bit in the end of the boring bar cuts a taper hole corresponding to that of the piston rod fit in the crosshead.

The walls of the cylinder *C* are ported at several places for bolting and inspection purposes and to save weight. The false head *H*, drilled with a number of holes also to save weight, is an accurate fit in cylinder *C* and is held firmly in place with flush set screws. An off-center hole is bored through head *H*, the center line of which is set at an angle to the axis of the main boring-machine spindle and two axes intersect at a point beyond the outer end of the boring bar. Thus, the tool cuts a conical surface, the diameter of which decreases as the bar is fed into the work. The hole through the false head for the boring bar is made large enough to accommodate a split bushing type bearing for the boring



Horizontal-boring-mill attachment for boring piston-rod taper fits in crossheads

bar *B*, which is 2½ in. in diameter by 18 in. long, and is spline-connected with head *H*.

In setting the tool bit in the boring bar end, it is important to have the cutting edge extend out of the boring bar on the same side as the spline, otherwise the taper will be cut in the wrong direction. The provision of a split-bushing bearing capable of easy adjustment to take up wear is essential so that desired accuracy in boring taper holes can be maintained.

Horizontal traverse and feed of the boring bar and tool bit, both in and out, are secured by universal joint connection from the inner end to the main boring machine spindle. This connection consists of two air-motor piston rods welded together and having one swivel joint connected to the boring bar and the other to the spindle.

Locomotive Boiler Questions and Answers

By George M. Davies

(This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.)

Leaking Girth Seams

Q.—Leaking seams between the first and second courses of our Mikado-type power give us much trouble. It is noticeable that this condition always exists at the bottom of the boiler. Why do these seams invariably leak at the bottom rather than along the sides or top?—E. Z.

A.—Rivets in the bottom of the girth seams leak because of the expansion of the boiler. The boiler expands to a greater extent in the steam space on the top of the boiler than in the water space of the shell of the boiler, and the difference in the expansion between the top and bottom of the shell of the boiler is dependent on the temperature of the steam at the top and the water below. It would appear that the top of the boiler would fail before the bottom, but this is not so, because expansion is occurring equally and normally over every unit of its length, whereas the lower shell is subjected to a higher stress brought about by the expansion of the top. This causes the cracking of the shell plate through the girth seam rivet holes, usually starting at the bottom. This condition is also aggravated when the frames of the locomotive are connected rigidly to the bottom of the boiler shell. Strains are transmitted through the wheels and frame to the boiler stressing it to a point where cracks appear in the bottom of the girth seams.

Finding Pitch For Tank Rivets

Q.—Kindly explain the simplest way to find the pitch of rivets in a tank having a diameter of 33 in. with ⅝-in. rivets spaced 2 in. apart.—R. J. T.

A.—The pitch of the rivets is the distance between the centers of the rivet holes; rivets spaced 2 in. apart have a 2-in. pitch. The rivets are usually laid out on a flat plate to the correct pitch. Assuming that the 33 in. diameter of the tank is the inside diameter and that the tank plate is ½ in. thick the neutral diameter of the tank would be 33½ in.

The rivet pitch should always be computed with the neutral diameter as a basis. The circumference of the neutral diameter in the example given is 105.243 in. The tank would have 52 rivets in the circumferential seam spaced at $\frac{105.243}{52}$ or 2.023 in. pitch. The holes are then punched or drilled as required before rolling. The reason for computing the pitch from the neutral diameter is because the neutral diameter neither gathers nor stretches when rolling the sheet but remains neutral, retaining its original length.

Water Glasses

Q.—Why do modern locomotives have one water glass connected directly into the backhead and another connected to the water bottle or column? Are there any advantages in using the water column over having the water glass connected directly into the backhead of the locomotive?—F. I. K.

A.—The common practice is to have a water column with its accessories on the right side of the backhead and a second water glass on the backhead on the left side. This arrangement gives a very reliable indication of the height of water inside the boiler under different conditions. Observations made in actual service have demonstrated that it will more accurately register the height

of water when the boiler is working than if the gauge cocks and water glass are applied directly to the boiler backhead especially on large locomotives and particularly on locomotives equipped with arch tubes.

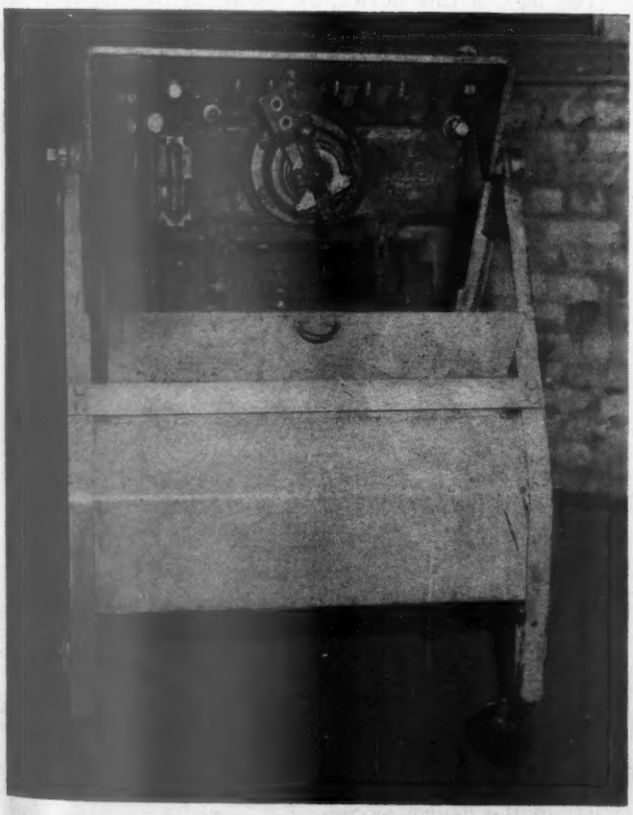
There is a strong upward current of water in the back water leg due to the circulation of water in the boiler. It is increased by the fast circulation through the arch tubes, the latter being very active. This tends to raise the level of the water close to the door sheet a little higher than the water in a more forward position in the boiler and the water glass and gauge cocks, attached directly to the boiler back head, are apt to be influenced by this excessive height close to the door sheet.

The advantage of the water column is that it is a more reliable indicator of the actual height throughout the boiler and over the various parts of the crown sheet. This, to a certain extent, is due to the water in the water column not being so much affected by the violent circulation of the water in the back water leg. The second and independent water glass is an advantage in checking and also serves as a guide to the height of water in the boiler in the event of the glass breaking in the water column until such time as the water column glass can be replaced. Another advantage is that the agitation of the water in this glass gives some indication of the activity of the water in the boiler when foaming occurs.

Lubricator Drain Rack

An effective lubricator drain rack has been built for use at the Sacramento, Calif., shops of the Southern Pacific. This rack consists of an angle-bar and steel-plate frame and box mounted on swivel casters. The lubricator mounting plate has ratchet stops so that the lubricator can be mounted in the upright position and then inverted over the steel box for the purpose of draining.

The rack is the same height as the lurbricator work bench and test rack, requiring no lifting of the lubricator when transferring it from one to the other. A suitable drain plug is located in the bottom of the box. The advantages of this device are that the lubricator may be put in an out-of-the-way place to drain and, by top draining, all oil is removed, thus keeping the work bench clean and avoiding any waste of oil.



Lubricator drain rack used at the Sacramento shops of the Southern Pacific

Questions and Answers On Welding Practices

(The material in this department is for the assistance of those who are interested in, or wish help on problems relating to welding practices as applied to locomotive and car maintenance. The department is open to any person who cares to submit problems for solution. All communications should bear the name and address of the writer, whose identity will not be disclosed when request is made to that effect.)

Overcoming Distortion in Welding

Q.—What are the causes of distortion in welding? How can it be overcome?

A.—Distortion in welded structures is ordinarily caused by a number of conditions which can be overcome with proper care. Often a shrinkage in the deposited metal pulls parts together and changes their relative positions. This can be dealt with by proper clamping or tacking of the parts to be welded and by preforming of parts with an allowance for weld shrinkage. Non-uniform heating of parts during welding often causes distortion. A welding sequence which prevents excessive local heating aids in the elimination of this type of distortion. In the case of heavy sections, preheating may be necessary or desirable. Distortion resulting from an improper welding sequence can be overcome by a study of the structure to determine that sequence which will give the desired results.

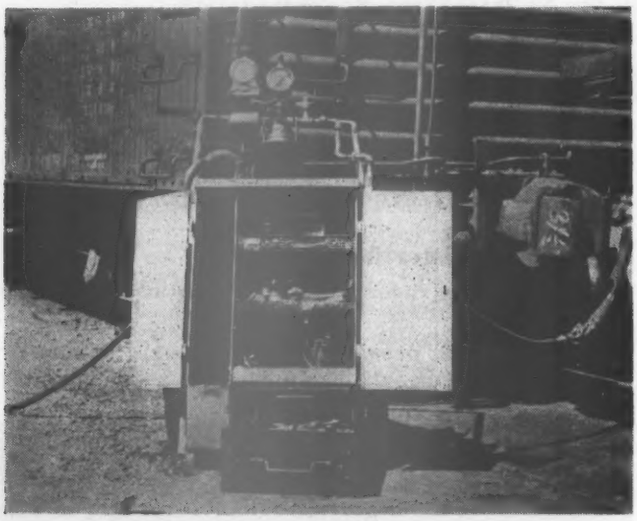
Courtesy Westinghouse Electric & Mfg. Co.

Distortion may occur for a number of reasons and study of each particular job is required for its prevention

With the Car Foremen and Inspectors

Three Devices For the Car Shop

The three car shop devices, described in the following paragraphs, were selected from a larger group, presented by W. S. Koerner, car foreman of the Chicago, Burlington & Quincy, St. Joseph, Mo., in a paper at the March 6 meeting of the Northwest Carmen's Association, at St. Paul, Minn.



Air brake work cart with doors open

Air-Brake Test Rack and Work Cart

This device is made of 1/16-in. sheet iron, with 26-in. roller bearing wheels and is equipped with shock-absorber springs to eliminate shocks to the air gauges, in going over rough places or tracks. There are three compartments made of front-end netting to prevent the accumulation of dirt and rust. The bottom compartment is made for tools which are removed intact and placed under the car when cleaning air brakes. This compartment also contains air-brake grease, oil, white lead, stencils, etc., so that everything necessary to complete a job is in this compartment.

At the top of the cart is a compartment 2 in. deep, 8 in. wide and 15 in. long where stencils, rules book, blueprints, instructions, etc. are carried. At the left side of the cart at the top is a space 6 in. wide, 6 in. high and 8 in. long where repair cards, etc. are carried. The long compartment on the side is for air hose, a long pipe wrench and a cleaner for reservoir tubes. The doors are made to lap over and when the doors are closed no rain or dust can enter.

A Westinghouse testing device is mounted on top of the cart at an angle so that the hands on the face of the gauge can be looked at squarely without stooping which facilitates accurate reading. The proper length of hose can be wound around the handles when moving from one car to another. An Eastman timer or an alarm clock with second hands can be placed beside the air gauge as shown in the illustrations.

The feature of this cart is the ability to carry everything for a day's work, except triple valves and long pipe, and being able to move the entire set of tools, stencils, etc. under the car so that it is not necessary to make any extra trips to complete the job. In addition, the exclusion of moisture and dirt keeps all tools and materials clean and assures a better class of work. With the testing device mounted on top of the cart, a more accurate test can be made, all of which goes a long way toward improving air-brake performance.

Device for Carrying AB Pistons

A device for carrying AB pistons is made from an old carbide can, equipped with two handles with a self-locking arrangement which consists of a wire, or bail, applied so that it can be slipped over the top of the non-pressure head when the latter is pressed down against spring pressure and the bottom of the head covers the can opening. After the AB piston is cleaned and lubricated in the air-brake room and put in this device no dirt can get to it. The can with the AB piston is taken to the car where it is removed and immediately applied to the cylinder with little chance to pick up dirt.

Changing Wheels On Bettendorf-Type Trucks

The legs of this device, as shown in the illustrations, are made of ordinary 1¼-in. pipe bent to the shape shown and the track for rollers is made of two pieces of 1-in. double-strength pipe. Trusses under the track are made of ⅜-in. pipe welded to the tracks on the bottom at each end. On the bottom of each leg is a round piece of ¼-in. metal, 8 in. in diameter, for a footing.

Air-brake test rack and work cart

The track pipes are spaced 4 in. apart and, at the center of the device on top of the track, is a steel plate ¼ in. by 4 in. by 14½ in., welded in place. A small hand jack is mounted on this plate with the standard

extending down through the plate and having a hook on the bottom for attachment of the center pin and key when raising or lowering truck bolsters. If a center pin cannot be used, due to no opening at the bottom of the truck bolster for the center-pin key, then S-hooks and chains can be employed by applying the hooks to openings in the top of the bolster.

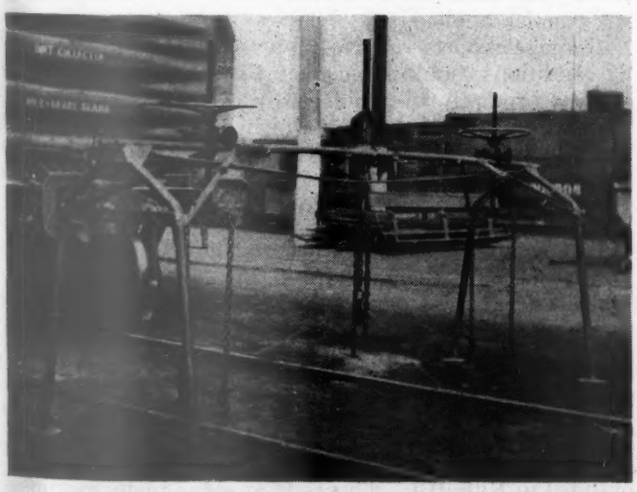
At each end of this device, operating on the pipe track, is a small dolly equipped with four roller-bearing wheels 3 in. in diameter and having a screw-type jack, hand-wheel operated, mounted on it. The jack standard extends below each of the dollies and is fitted with an equalizing bar and two drop chains in each end for attachment to the truck sides. On the end of each

Effective method of keeping AB brake pistons clean

chain is a grab hook making the chains adjustable for any type of side frame. These small dollies move back and forth for a space of 24 in. and, having roller bearings, are easy to move.

There are two hooks ⅜ in. in diameter by 14 in. long on each end of device, supported from the side braces and used in removing wedges, brass, truck, springs, rollers, spring seats, etc., so it is not necessary to use the hands for any of these operations, with attendant possibility of personal injuries.

The legs on each end of the device are so constructed and arranged that they are entirely in the clear and



A light one-man device for changing wheels on Bettendorf-type trucks

How the wheel changing device is used on a repair track

allow full access to journal boxes, and to truck springs, brake-hanger pins, etc. A carrier for the device is made of 1¼-in. ordinary pipe with braces made of ⅜-in. pipe welded in place. The carrier is equipped with slots on each end that fit under the end braces of the wheel-changing device so that when it is mounted on the carrier there is 8 in. clearance from the ground on all four legs. The carrier is equipped with 36-in. roller bearing wheels which permits moving the wheel changing device to any part of the yard or repair tracks over rough ground, ice, snow, and rails without any trouble, and by only one man.

This device was built so that it could be moved to any part of the shop or repair track by one man and thus avoid the necessity of having from two to four men generally used to assemble various devices or long pieces of pipe or poles used at many repair points in changing wheels in Bettendorf-type trucks. This device promotes safety, saves labor, increases output and contributes to better workmanship by reducing the possibility of marring journals while removing or applying truck side frames.

Handling Heater Pipes

When baggage and mail cars are shopped for heavy repairs, it is frequently necessary to remove the large and heavy heater-pipe sections so that necessary work, including painting can be done back of the pipes. The way these pipes are handled in order to save time and labor at the Sacramento, Cal., shops of the Southern Pacific is shown in the illustration.

The pipe sections are disconnected and the double holding straps which keep individual pipes in the correct position for draining purposes are unbolted from the car wall. One end of each pipe section is raised just enough so that the two-wheel dolly, illustrated, can be rolled under as far as the center of the section.

It will be noted that the bottom pipe (or pipes in case of a dual section unit) are centered on the axle of the two-wheel dolly by a pair of positioning lugs welded to the axle. At each end of the axle, close to the wheel, is a bracket with hinge connection to a piece of ⅜-in. by 1½-in. strap iron which is about 5 ft. long and drilled with a number of ⅝-in. holes in the upper end so as to give a variable position for the application of a holding bolt.

With this bolt applied through the two straps and the nut tightened to bring the straps firmly against the pipe section, it is clear that the entire section, or group of pipes, will be held in a vertical position and can be

easily rolled through the car to the high end door and thence lifted by the shop crane or other means out of the car.

Subsequently, in case no repairs are required to the pipe sections, they are rolled to some convenient part of the shop for temporary storage until it is time to return them for reinstallation in the car. In this connection, it will be noted that storage of the pipe sections in a

Dollies for handling heater-pipe sections in baggage and mail cars

vertical position saves floor space. Additional labor is saved because the dollies are so simple and inexpensive in construction that, as a rule, enough are available so that one can be kept with each pipe section while it is in the shop and need not be disconnected.

Cooperation In Billing for Car Repairs*

By W. J. Schmidt†

Bill clerks have often expressed their desire to have the opportunity of getting out in the field and discussing their problems with the men who actually make, supervise and record repairs to freight cars. Our problems are many and, in most cases, the only method available to solve them, is by correspondence and telephone. Obviously, therefore, those preparing billing repair cards for submission to the billing office, should check them thoroughly before they are released. I feel that the publicity given some of the irregularities which will be called to your attention in this paper, will, in part, answer that desire. We cannot hope, and do not intend to endeavor to bring out every detail that might be of interest to you, but are desirous of pointing out some of the more important items involved in the correct preparation of billing repair cards, also calling attention to some of the more common errors.

* Abstract of a short paper presented at the February 15 meeting of the Car Department Association of St. Louis.

† Chief clerk, mechanical department, Alton & Southern.

Correct details on billing repair cards—i.e., car number and initial, kind, load or empty, date of repairs and repairing point—are essential to the proper rendition of bills.

All items of repairs must be distinctly recorded, showing proper location (as outlined in Rule 14), size or weight when necessary, new or second-hand, or any other pertinent information necessary properly to identify and price out the material applied. Description of all items of material should be as brief as possible, using standard A. A. R. abbreviations and symbols. A. A. R. Rule 9 clearly defines the information necessary to be shown in this respect.

The information shown in the "why made" column is of equal importance in the correct pricing of repaired items; same to show whether broken, missing, worn, bent, damaged in repairs, first application, etc., and also whether damaged under conditions defined in A. A. R. Rule 32.

Errors in Recording Wheel and Axle Renewals

The great number of errors made in recording wheel and axle renewals warrants special mention. Rule 9 provides that where cast-iron wheels are involved in the renewals, information as to whether they are single-plate bracketed, single-plate not bracketed, or double-plate must be shown, together with the weight, and failure to do so is a common error. Where multiple-wear wheels are involved, flange wear and service metal, as measured with the standard steel wheel gauge, must be shown, and judging from the information shown on repair cards, it is obvious that many record writers are unfamiliar with its use. Rule 98 requires that certain information be recorded at the top of the Wheel and Axle billing repair card in connection with restoration of full flange and tread contour, and when this information is omitted, billing repair cards must be returned for correction. Information required in connection with the renewal of one-wear wrought-steel wheels, as defined in Rule 9, should be carefully studied and properly shown.

The dimensions of axles applied and removed should be accurately measured and recorded. Par. C of Rule 86, showing the limiting dimensions for second-hand axles, must be memorized and adhered to, as failure to do so, results in scrap axles being credited as second-hand, or scrap axles being applied as second-hand.

The work of a bill clerk is materially simplified by legibility and neatness of repair cards and by grouping associated details with the major item of repairs. For example, in recording a coupler renewal, the securements and attachments should follow the description of the coupler applied.

Damage reports relative to cars damaged under Rule 32 conditions should be furnished supervisors and record writers promptly to avoid repair cards being submitted with erroneous information which may result in the car owner being improperly billed.

Joint Efforts Required to Correct Errors

In conclusion, let me say that cooperation in billing for car repairs often results in the bill clerk detecting improper practices on repair tracks and in transportation yards which in turn are called to the attention of the proper parties for correction. For example, attention was recently called to a case where two new Cardwell draft-gear casings were applied with second-hand parts, resulting in a loss to the repairing line on account of the charge being confined to second-hand as outlined in Rule 101. This is only one of many examples that could be cited and indicates that careful study in

connection with repairs will result in more economical operation.

The importance of studying the A. A. R. rules and all current changes, by both the record writers and bill clerks, cannot be overemphasized and your attention is directed to those contained in Supplement 1 to this year's rules, just issued.

Plugs for Dust Guards

The A. A. R. Mechanical Division calls attention in a letter dated April 24 to the large number of dust-guard plugs missing from journal-box dust-guard slots. This of course results in rain, snow, and other foreign matter contaminating the packing in the box.

The Committee on Lubrication has proposed a revision of the standard method of packing journal boxes which will be submitted to the association at the annual meeting in June of this year, and in this revision they propose to make mandatory the application of a close-fitting dust-guard plug.

How a wooden dust-guard plug is sealed with plastic compound

It is also important that dust-guard plugs be maintained, and replaced when found missing. In this connection, the A. A. R. letter states that the following conditions are general over the country:

A plain wooden dust-guard plug does not adequately seal against water unless it is individually fitted and, even when made close fitting, it has insufficient holding power, due to continual swelling and shrinking, to remain in place for any length of time. There are on the market metal clips for holding wooden dust guards in position which improve the holding properties and wooden guards may be sealed with a plastic material which makes them more efficient.

When metal covers are used, it is important that they be properly applied by forming them to fit the journal box, after which the ends should be bent down and covers tightened in place. When metal covers are found loose in service they should be tightened by suitable means.

A felt dust-guard plug sealed with plastic compound

The practice of sealing dust-guard plugs with plastic material is proving successful in service, and this method of application is commended. The accompanying illustrations show sealed dust-guard slots, cut away in the center for the purpose of photographing, which illustrate a wood plug, a metal plug, and a fibrous material resembling felt.

When car wheels are changed, it is particularly important that dust-guard plugs be properly reapplied. The plugs can also be given attention when cars are on repair tracks, or at the time of periodic re-packing, and this should be arranged for.

Application of steel strip dust-guard plug sealed with plastic compound

Dolly for Moving Cars

Occasionally it is necessary in car shops to move a car after a truck has been removed for repairs. At points where the truck repair location is at some distance from the general repair track a four-wheel dolly developed on the Baltimore & Ohio will prove useful. The dolly can be placed under a car after the regular truck has been removed and permits movement of the car to any desired location in the shop. The dolly, as built at the Chillicothe, Ohio, shop of the B. & O., consists of a welded sheet-steel inverted V-shaped box structure mounted on four

The car center sill rests upon a four-wheel dolly which replaces the car truck and permits the movement of the car on repair tracks

Storage space for jacks and other tools is provided in the body of the dolly

wheels of the type used on section cars. One of the faces of the box structure is removable to permit the use of the interior of the box for the storage of jacks, jack handles and blocks which are needed in raising cars.

Air Brake Questions and Answers

HSC High-Speed Brake Equipment for Passenger Cars and "A" and "B" Diesel Locomotive Units

248—*Q.—Describe the release after application.* A.—As the brake valve is moved toward release position, the handle cam *77* moves away from the floating lever stem *68* of the self lapping unit. The lever *67* then pivots on the closed inlet valve *50* and the release valve spring *63* moves the release valve *64* away from its seat, allowing control pipe air to flow at atmosphere through the brake valve exhaust port ex. If the brake valve handle is moved only part way toward release, control pipe pressure in the brake valve cavity *B* and acting on piston type exhaust valve seat *59* will be partially reduced and the regulating spring *58* will move the seat into contact with the release valve and prevent further flow of air from the control pipe. With the brake valve handle in full release position the handle cam *77* is moved away from the floating lever and the exhaust valve spring holds its valve *64* open to vent all air pressure from the control pipe.

249—*Q.—Does this take care of control pipe pressure?* A.—Yes. Control pipe pressure is quickly increased or decreased in small graduations as desired.

250—*Q.—How many positions has the MS-40 brake valve when used in automatic service?* A.—Five; from left to right as follows: release, first service, lap, service and emergency.

251—*Q.—Is the valve locked in automatic operating position?* A.—Yes. Shifter lever *41* is locked in automatic operating position where the letters "AU" are exposed.

252—*Q.—Explain the operation when locked in this position.* A.—Locked in this position the collar *94* engages quadrant *82* so that movement of the brake valve handle is transmitted through shaft *95* to rotary valve key *80* and to the rotary valve *54* which establishes the port connections on its seat *135* for the different handle positions, as indicated by the position diagram on Fig. 32. The handle positions are notched on the quadrant and are indicated by latch *86* moving into these notches under pressure of latch spring *87*. Disc check valve *90* is located in the feed valve supply passage where it prevents flow from the brake valve chamber and brake system to the sanding port when sanders are used.

253—*Q.—How is direct pipe exhaust at an emergency rate obtained?*. A.—Emergency valve *10* and its latch valve *12* provides a direct brake pipe exhaust at an emergency rate when the brake valve handle is moved to emergency position, in which position a cam on the handle shaft engages plunger *11* and unseats inlet valve *12*, exhausting brake pipe air from the spring cavity and, therefore, the latter is exhausted quickly, relieving the pressure on valve *10* so that the valve is opened easily by the plunger.

254—*Q.—What holds the valves seated in other positions?* A.—In other positions the brake valve handle, springs *13* and *14* and brake pipe pressure hold the valves seated.

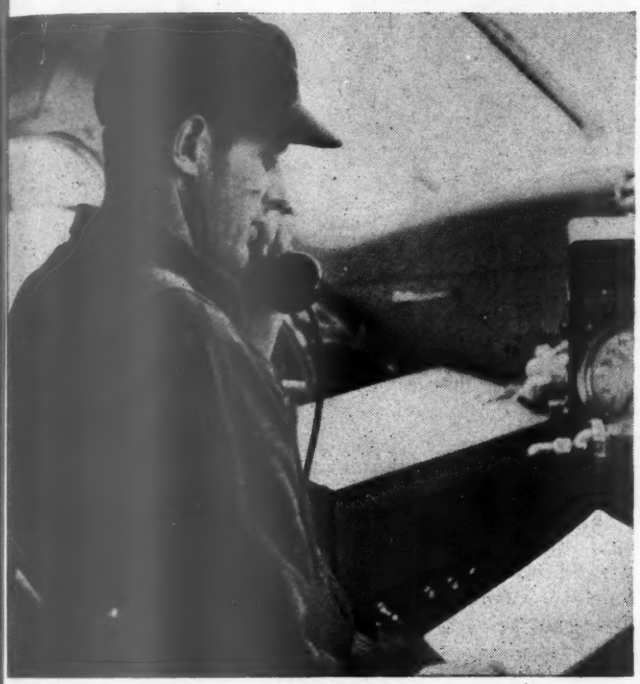
255—*Q.—How is manual sanding accomplished?* A.—Manual sanding is accomplished by depressing the handle *103* upon the sanding bail *111* which unseats sanding valve *31* through plunger *30*, permitting feed valve air to flow to the sanding pipe. Choke *46* provides a timed release of sanding pipe pressure after the spring *32* seats valve *31*. Sanding stop spring *19* cushions handle pressure on the sanding bail when sanding and returns the handle.

256—*Q.—How is the exhaust valve unseated?* A.—Exhaust valve pawl *142*, Section A-A, is located between the handle shaft and exhaust valve *146*. In *release* and *first service* handle positions a cam on the shaft lifts the pawl and unseats the exhaust valve, opening the cavity leading to passage 8 to atmosphere.

257—*Q.—What holds this valve seated and in what position?* A.—In lap service and emergency positions spring *149* holds the exhaust valve seated and the atmospheric connection closed.

258—*Q.—Can the brake valve handle be unmoved in any position?* A.—The brake valve handle can be inserted or removed only in *lap* position.

Train Communication



D. & R. G. W. locomotive uses radio-telephone equipment to communicate with the conductor in the caboose

A general summary of recent activities shows that all forms of equipment now available are to be tested

A NUMBER of railroads are now using, planning to use or are experimenting with end-to-end and train-to-wayside communication systems. A few installations are being used regularly, some are being experimented with, and several railroads have appointed men to the specific task of developing such communication systems to meet railroad requirements.

Within the past several months the railroads have been repeatedly criticised, in the press and by radio broadcast, for not having used train communication systems. These critics state that communication systems would have averted disastrous wrecks and suggest that, with the new knowledge of communication systems developed by the war, the railroads have been remiss in not so equipping their trains. Railroad operators know that signal systems employing track circuits are more suited for train protection than is radio, but in response to their critics they have had occasion recently to become vocal about what they are doing.

History

Railroad experiments with end-to-end and train-to-wayside communication date back almost as far as radio broadcasting. The first really comprehensive trial was that of a carrier-current system in 1925. One radio telephone was installed in 1926 and another in 1927. An inductor type system, using the rails and a wayside wire, was given a quite thorough trial in 1933. Over the same period there were other systems falling into these general classifications which were also tried. Variously they failed to fill all requirements. The early radio communication systems which were tried were unable to maintain continuous communication at all times; and since their output was broadcast, it was necessary for the Federal Communications Commission to supervise their operation, and for the railroads to obtain experimental licenses. Because there is such demand for wavebands up to and including the so-called short waves, it seemed improbable that permanent licenses could be issued for railroad application and manufacturers were reluctant under these circumstances to continue with development work.

The U. S. & S. System

The Union Switch & Signal Company's train communication system appeared in 1937. It is a carrier-telephone system in which the carrier current is fed conductively into the rails, picked up inductively from the rails and induced into the wires of any communication or power line which may also be used for other purposes and which is adjacent to the track.

Current is carried through the rails and line wires between the front and rear ends of trains, from one train to another and to wayside stations by direct wire connections in the vicinity of the station. It is a private system of communication in that it cannot be tuned in by commercial radio receiving sets. The latest application is that on the Belvidere Branch of the Pennsylvania Railroad, which was described in the March, 1944, issue of *Railway Mechanical Engineer*. The system, as originally developed on the Bessemer & Lake Erie, where it has found favor for both main line and yard operation, was described in the July 29, 1940, issue of Railway Age and the July, 1940, issue of Railway Signaling. One adaptation of the system for use in yards is that of the Norfolk & Western at Roanoke, Va., described in the December 11, 1943, issue of Railway Age.

Ultra-Short-Wave and Micro-Wave Radio

The feasibility and potentiality of modern radio communications in railroad operations will be subject to exhaustive study in the Chicago area and elsewhere by the Chicago, Burlington & Quincy in collaboration with the Bendix Radio Division of the Bendix Aviation Corporation. Permits for the construction and operation of the necessary experimental radio stations were granted the Burlington on May 2, 1944, by the F. C. C.

Paul B. Burley, assistant engineer in the office of W. M. Vandersluis, general superintendent of telegraph and signals, Illinois Central, has been appointed as electronics engineer, with full-time assignment to this subject. The work on the Illinois Central will be carried on in coordination with the findings of the Radio Technical Planning Board, of which the Association of American Railroads is a sponsoring member.

A program of study and experimentation in the use of radar and other electronic devices for train communication and control has been undertaken by the Chicago, Rock Island & Pacific. Ernest A. Dahl, electronics engineer, formerly employed by the Western Electric Company in radar and micro-wave work, has been appointed to direct the Rock Island investigations. The Rock Island plans to develop a radio communication system in the micro-wave region. Attention will first be given to radio communication between the head and rear ends of trains and between yard offices and switching crews. Ultimately, communications between dispatchers and crews of trains on line will be considered.

Radio of very high frequency, similar to that used in some types of aircraft, is being experimented with for railroad use, after investigation begun nearly a year ago on the Baltimore & Ohio. An announcement made by A. S. Hunt, general superintendent of communications, B. & O., adds that the experiments are being carried on jointly by the railroad and the radio division of Bendix Aviation Corporation.

The Federal Communications Commission has granted permits for the construction of five radio transmission stations on the B. & O. between Baltimore, Md., and Pittsburgh, Pa. Four of the stations will be mobile transmitters about the size of a household floor model set, weighing about 130 lb. No revolutionary changes in railroad communications are expected immediately, but the results of the impending tests are expected to provide railroads with information concerning the potentialities of very high frequency radio transmission in railroad use in the postwar period, when the equipment will be available from radio manufacturers.

The Federal Communications Commission on May 2 ordered an investigation and public hearings "to inquire into the feasibility of using radio as a safety measure and for other purposes in railroad operations." The announcement stated that the F. C. C. has invited the Interstate Commerce Commission to cooperate in the investigation and has suggested that a committee of I. C. C. commissioners be named with a committee of F. C. C. commissioners to preside over the hearings, the date for which has not yet been set.

Applications for experimental radio stations have also been made to the F. C. C. by the Atchison, Topeka & Santa Fe; Reading; Westinghouse Radio Stations, Inc., and Jefferson-Travis Radio Manufacturing Corporation. The applications seek two-way radio communications between the dispatcher and trains in motion, between trains, and between the head-end and rear-end of each train. Also contemplated is the use of "walkie-talkies" for flagmen and brakemen.

D. & R. G. W. Tests

The Denver & Rio Grande Western has made tests of radio for communication between the locomotive and the caboose of a freight train on a 1,140-mile round trip between Denver, Colo., and Salt Lake City, Utah; tests were also made between the yard office and a switch engine in a yard at Roper, Utah, near Salt Lake City. The trip west from Denver to Salt Lake City was made on April 14 and 15, the yard tests at Roper were made April 16, and the return trip to Denver was completed on April 18.

These tests are part of a program of the Rio Grande's research and testing laboratory. A year or more ago, E. A. West, general manager, directed Ray McBrain, engineer of standards and research, and A. S. Hunt, superintendent of communications, to study the possibilities of radio and electronics for communication between engine and caboose, from train to train, and between trains and the dispatcher. Mr. Hunt recently left the Rio Grande to become chief of communications on the Baltimore & Ohio, and was succeeded by W. W. Pulham, while Ed Musgrove has been appointed electronics supervisor.

Conductor in the cupola of a D. & R. G. W. caboose talks with the fireman shown on the preceding page

High-frequency, short-wave, frequency-modulation radio apparatus furnished by the General Electric Company was used on this test. The equipment is similar to but not exactly identical with that which has been manufactured and used extensively during the last two years in other fields. Each complete set of radio apparatus, designed for both sending and receiving, is mounted in a case about as large as a medium-size home radio. The upper portion of one of these sets is shown to the left of the fireman seated in the cab of the Diesel-electric freight locomotive used in the tests. In the caboose, the radio equipment was mounted in the cupola, as shown in a different illustration herewith. Whip-type antennas were mounted on the nose of the locomotive and on the rear platform of the caboose. The radio transmitters require an input of about 60 watts at 110-volts, 60 cycle, a. c. As a means for supplying this demand temporarily for this test, lightweight portable gas-engine driven generators were used, one being mounted in the locomotive and the other in the rear part of the caboose.

On the westward trip, the train consisted of about 70 cars, and on the return trip about 52 cars. Cars were set out and picked up at various points on the line. The route followed was over the Denver & Salt Lake via the Moffat Tunnel for 125 miles between Denver and Orestod, then via the D. & R. G. W., between Orestod and Salt Lake City. This route includes some 52 tunnels, rugged canyons, miles of desert, numerous curves with a few horseshoes, and much heavy grade up to 2 per cent. The top altitude is 9,300 ft. at the apex in the Moffat Tunnel, and the lowest is 4,080 ft. at Green River, Utah.

The radio-telephone equipment was continued in service throughout the road trips, so that the engineman and the conductor could carry on conversation at any time concerning matters having to do with the operation of the train. For example, the engineer and the conductor compared train orders by telephone. The engineer was advised by telephone when the rear brakeman had re-

turned to the caboose after flagging or after closing switches. On one occasion, the engineer used the communication system to tell the conductor of a car which had developed a hot journal, and the conductor directed where to stop the train and set out the car. The rear brakeman left the caboose at once and proceeded over the tops of the cars, arriving at the car in question by the time the train had stopped, thus saving considerable time.

At another place on the trip, a brakeman noticed smoke coming from a wheel under the third car from the rear of the train. Using the telephone from the caboose, the engineer was told about the smoke, whereupon he acknowledged the information. He then made an application and release of the brakes, thus kicking off the sticking brake shoe, and thereby eliminating the trouble without perceptibly slowing the train. On the other hand, if the radio-telephone had not been in service, the conductor would have had no other choice but to try to attract the engineer's attention by flagging or to pull the air for an emergency stop which might have resulted in pulling out a drawbar or other damage. Other situations in train operation were handled by radio-telephone which otherwise could have been solved only by hand signals, lantern signals or by stopping the train. Owing to the mountains, tunnels and curves, the communication was especially advantageous on this territory. Practically all of the "highballs" were given over the telephone, and were so acknowledged from the locomotive.

The radio reception and resultant telephone conversation between the two ends of the train were satisfactory at all places on the route, except when inside the 6.2-mile Moffat Tunnel under the Continental Divide. Here, Rio Grande technicians are planning to use a feeder aerial or a re-broadcast arrangement to provide correct operation when trains are in the tunnel.

During part of the time when the test trains were on the road, tests were made to determine the range of the apparatus for possible use between two or more trains or between trains and a wayside office. A radio set, including a receiver but no transmitter, was placed in an automobile, which was driven about near the city limits of Denver. The telephone conversation from the train was received satisfactorily in the automobile while the train was as far as 53 miles away.

When making the tests in the freight yards at Roper on April 16, one of the radio sets was placed in the yard office, and the other radio equipment was transferred to a yard locomotive. Conversation was then conducted while making various switching moves, with satisfactory results.

In the D. & R. G. W. tests whip-type antennas were used

(Left to right): W. W. Pulham, superintendent of communications, D. & R. G. W.; Fred I. Deetken, General Electric Co.; Ed Musgrove, electronics supervisor, D. & R. G. W.; F. M. Orsborn, General Electric; F. H. Doremus, General Electric; W. H. Sagstetter, chief mechanical officer, D. & R. G. W.; E. A. West, general manager, D. & R. G. W.

View of the D. & R. G. W. caboose used for radio tests

Flexible joint pipe connections are used between the steam outlets and the cars—Picture was taken in the rain and the vapor shown is caused by rain falling on the hot pipes

Standby Service for

Army Hospital Trains

Cars must be ready for instant service and so equipped as to receive electric power at any location where they may be parked

UNITED States Army hospital trains are in constant readiness at the Army's Arlington Yards in Staten Island, N. Y., the cars being converted to Army requirements for the most part from Pullman observation and lounge cars, and each train is accompanied by a specially built, completely equipped kitchen car. The interior of these cars has been completely rebuilt so as to simulate as nearly as possible a hospital ward. Open double-decker bunks provide sleeping quarters for the sick and wounded. The hospital ward dressing car includes an operating room with examining table, sterilizers, and all the necessary instruments and sterile dressings that go to complete such a unit. The kitchen cars supply the meals during hospital train movements. The cooking is done in these kitchen cars by Army-trained cooks.

Connection box for the Tungar rectifiers—Wing nut binding posts are in the upper left, the fuse cutout, lower left, and the double-throw switch, right—The man is holding one of the harness terminals

The hospital train yard at Staten Island is one of several located along the eastern seaboard where wounded and ill, brought in from overseas, can quickly be put aboard trains routed to other cities nearer their homes. The best hospital for any wounded or ill soldier is one where his folks can be with him and talk to him. This is a great aid in shortening recuperation and convalescence.

After the discomfort of the foxholes and all the sights, sounds and odors of conflict, comfort and cleanliness are potent aids to surgery and medicine in hastening recovery. The cars are kept well lighted, at proper temperature, well ventilated and clean.

The conditions of operation affecting these hospital cars are not like those under which Pullman cars are ordinarily operated. Pullman cars are in constant use; the axle generators on them run many hours in each day to keep the battery charged, and there is a steam supply from the locomotive which is available every day as long as the cars are in use.

A great deal of the time the hospital cars are not in

Above: Stretcher-borne patients are moved into the cars through doors in the side near one end—Top right: Interior of one of the kitchen cars

Above: Device for removing filler caps from batteries in the back of the boxes—Right: Interior of one of the ward cars—Below: Interior of the power plant—Bottom right: One of the two portable chargers

A pair of the 30-amp., 230-volt receptacles for the harnesses serving the rectifiers of the cars

use but nevertheless must be kept ready at all times for instant emergency service at any hour of the day or night. There is a continual supply of steam at about 80 lb. pressure in very cold weather and somewhat lower steam pressure in mildly cold weather. This steam is supplied at the Arlington Yards from two Pacific Johnson high pressure stationary steam boilers through a 6-in. steam line to the storage yards.

Steam connections from the steam line to the cars are made through piping equipped with Vapor flexible metallic joints. Compressed air is supplied to the cars by two two-stage air-cooled Ingersoll Rand compressors, each driven by a 25-hp. General Electric a.c. motor.

The trains are stored on four parallel tracks, each about 1,200 ft. long.

The cars are kept immaculately clean, the cleaning methods used being based on studies of methods used in railroad and Pullman yards. Heavy and light oxalic solutions are used for washing the exterior of the cars. The interior cleaning consists of washing the walls with a light solution of Orvus paste. The linoleum floors are scrubbed with kerosene, then waxed and polished. All windows are washed inside and out; all metal piping, sinks, wash basins, scrub basins, etc., together with their fittings are polished. The interior and exterior cleaning takes place after the return of each car from a trip. The interior passes as rigid an inspection as any Army hospital ward.

Lighting and Air Conditioning

In all ward cars the original berths have been replaced with double-decker beds, a space being left at the end of each car for a nurse's desk. In the hospital ward dressing car there is an operating room at one end, the space being made available by removing two bunks, sleeping 30 patients, whereas the hospital ward car sleeps 32. At the other end of each type of car are two doors on the side of the cars which open inwards and serve as a loading platform for entraining litter cases.

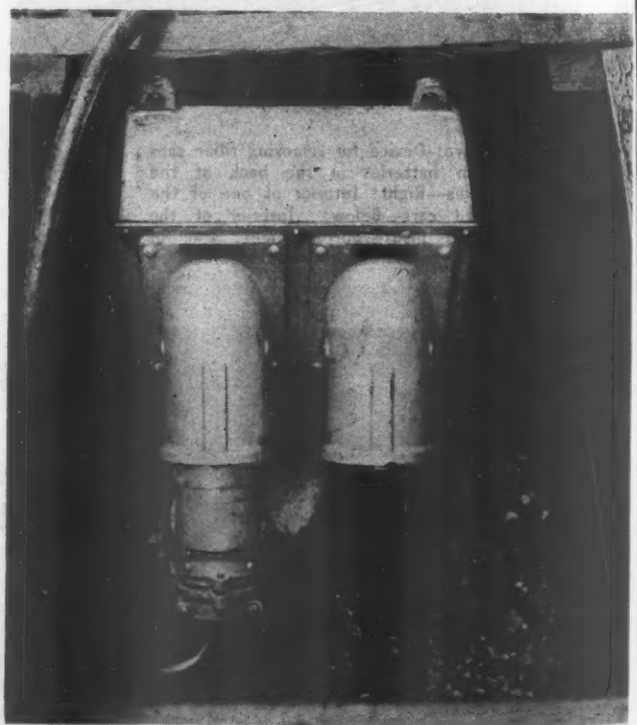
The overhead lighting system originally installed in the cars has been retained. This consists of 75-watt lamps in bowl type reflectors. There are six-watt aisle lights between alternate beds on each side of the car. Special lighting is used in the nurses' quarters and operating rooms.

All cars are fitted with ice-activated air-conditioning systems, the necessary power for water and air circulation being taken from the car battery. Steam for hea ing the cars is thermostatically controlled, the contr relay also operating from the battery. The batter equipment on each car consists of a 600-amp. hr. (8-h rate) 16-cell type EPTA-25A Exide-Ironclad batter The finishing charge rate on this battery is 36 amp this of course may be exceeded before the battery voltag has risen to 38 volts (2.38 volts per cell), but not after The interior temperature is maintained at 72 deg. F this temperature being considered best suited to the re quirements of the sick.

Under standby conditions (cars waiting but not in service) the batteries must be charged at least once a week. To take care of this requirement, and also to provide for charging when cars are away from base and not in yards having regular charging systems, each car is equipped with rectifiers which can receive power from any 115-volt or 230-volt single-phase a.c. source of power.

The rectifier equipment consists of two General Electric Tungar battery chargers mounted in a cabinet at one end of the car. The secondaries of the chargers are connected in parallel and can furnish a maximum of 24 amp. to the car battery. This tapers to about one half that rate when the battery is fully charged. The primary circuits of the chargers may be connected either in series or in parallel so that the chargers can be supplied by either 230- or 115-volt circuits. Connections to the primary are carried to a box mounted under the car at one side. In these boxes are two binding posts for connection to the wayside power supply and a double-throw switch for connecting the Tungar primaries either in series or in parallel.

At the Arlington Yards power to the Tungar chargers is supplied from a 220-volt, single-phase a.c. power source which is brought into the yard in rubber-covered wire placed in conduit underground, there being 16 outlets terminating in 230-volt Russell Stoll receptacles. Connection from the receptacles to six or eight cars is made by means of a harness consisting of cables termin-



A pair of the 60-amp. three-phase receptacles used for supplying the portable motor-generator sets

The two 12-amp. Tungar battery chargers as mounted in a cabinet in a ward car

ating in outlets spaced a car length apart along the cable. One of the harnesses is a 240-ft. length of three-conductor No. 8 Tirex cable, with six branches terminated by Hubbell receptacles. A short two-wire connection fitted with a Hubbell plug on one end and with bare wire terminals at the other is used to connect the car to the harness outlet. The second harness is 300 ft. long and has eight branches.

For batteries in need of considerable charge, such as those on cars which may come back to the yard minus a generator belt, special charging facilities are provided. These consist of two General Electric portable motor-generator type chargers rated 230 volts, 60 cycles, three-phase a. c., and 100 amp. d.c. at 32 volts. To facilitate the movement of these chargers and also for other purposes, a 4-ft. cement walk was placed between car storage tracks. Without the walk six men were required to move the chargers over the cinders, but on the walk they may be moved easily by one man.

Power for the operation of these chargers is also brought into the yard through rubber-covered cable in metal conduit and terminated in six 60-amp. 230-volt Russell Stoll receptacles. Connection from the receptacles to the chargers is made by a 250-ft. length of four-conductor No. 8 Tirex cable terminating in a Pyle-National plug and receptacle at the charger. On the d.c. side there are two 25-ft. lengths of No. 1/0 two-conductor Tirex cable terminated at each end by an Albert & J. M. Anderson plug. Either one or two batteries may be charged by each charger. The charging rate is automatically reduced by the voltage rise when the battery approaches a condition of full charge. The variety of plugs and receptacles used makes it impossible to make a wrong connection or to connect a battery with the wrong polarity.

Clearances in the battery boxes above the batteries are small; and to take care of this, special filling nozzles and a device for removing the caps from filler openings in the rear batteries have been devised. The latter consists of a small beveled gear and pinion mounted on one end of a flat wooden strip about 30 in. long. The rod or shaft from the pinion extends the length of the strip and is terminated at the opposite end by a wing nut. On the opposite side of the gear there is a four-fingered metal clip flared out so that it may be pressed over the ribs of the filler cap. When the clips are applied to the caps, the caps are unscrewed by turning the wing nut. An insulated covering over the pinion shaft avoids the possibility of short-circuiting battery terminals when the device is in use.

The installation was made and is operated entirely by Army forces.

Gas Fired Soldering Copper

Borrowing an idea from the casket industry, the National Electric Coil Company, Columbus, Ohio, has developed an internally gas fired soldering copper which is particularly well suited for the soldering of armature leads to commutator risers. The tip can be heated to

A 4-lb. gas fired-soldering copper used for applying coil terminals to commutator risers

working temperature within sixty seconds, and to red heat in four minutes. A simple, instantaneous regulation holds the heat steady at the selected temperature. The device is light in weight, will function in any position, and cannot be extinguished by fumes or submersion. Different sizes and shapes of coppers can be substituted for the one shown in the illustration.

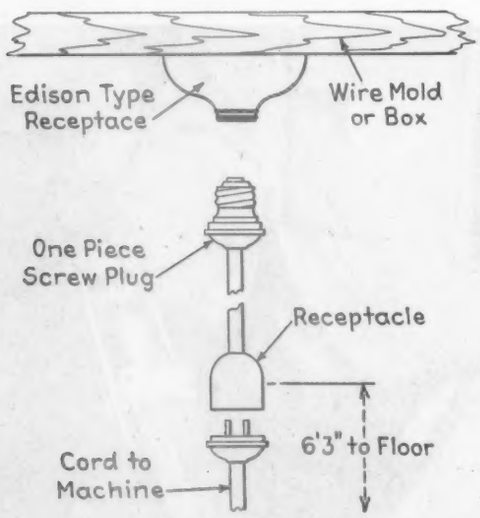
One type of unit is made for operation on natural gas and another on gasoline or artificial gas. The gasoline vaporizer unit is used to supply fuel to the artificial gas torch where piped gas is not available. An air-line pressure of at least 20 lb. per sq. in. is necessary.

Outlets for Office Machines

How can I install receptacles in a large office so that adding machines and dictaphones can be used at any location? There are no posts on which to fasten the outlets.

Ceiling a Better Place Than the Floor for Receptacles

Since the question precludes the use of posts or walls, there remains only the floor or the ceiling as a possible location for the receptacles. Anyone who has ever installed electrical receptacles in or on a floor will immediately vote against this possibility. Therefore, consideration must be given to the ceiling as the best place for installing the receptacles.



Major items needed for making the ceiling connections

In view of the fact that the question specifies that portable machines are to be used "at any location" it is necessary to blanket the whole ceiling with receptacles. The distance between receptacles may vary in accordance with the desk spacing, etc. However, it is suggested that the receptacles may be located in rows spaced from eight to ten feet apart, and with a receptacle located every eight or ten feet lengthwise of each row. If the suggested ten-foot spacing is used, no spot in the room will, in a horizontal distance, be more than about seven feet from a receptacle. With this arrangement, short extension cord can be used.

It is suggested that ceiling outlets of the Edison screw base type and one-piece screw plugs be installed in place of the two-prong types generally used with baseboard receptacles. The reason for this resides in the fact that there will be considerable pull exerted by the extension cords hanging from the ceiling.

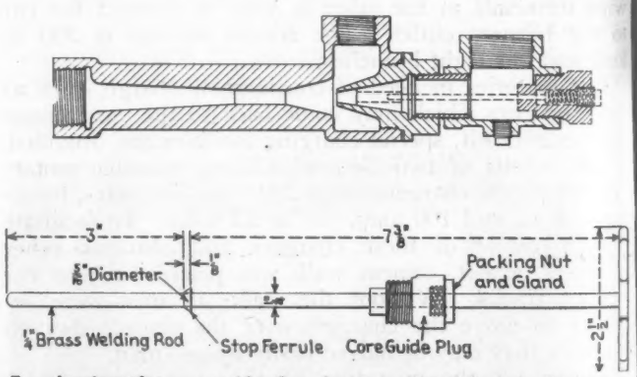
In order to obviate the necessity of using a ladder every time it is necessary to connect or disconnect a machine, short drop-cords may be provided with a one-pie Edison type screw plug on one end and a socket or ordinary two-prong type extension-cord receptacle the other end. The plug of the extension cord may attached to the ceiling receptacle at the most used l cations, and the adding machines or dictaphones ma be attached to or disconnected from the bottom end the drop-cords without the use of a ladder. It seem unnecessary to suggest that the drop-cords should be such a length that the receptacle on the lower end wi hang about six and one-half feet above the floor.

If we assume that the room requires one hundred the Edison type receptacles, it will probably be foun that thirty of the drop-cords will be more than enoug to take care of the number of machines actually in us at one time. By the use of a ladder, the drop-cord can be moved from receptacle to receptacle in accordanc with major shifts in working conditions, while th business machines can be attached to or disconnecte from the drop-cords to accommodate minor variations i the requirements.

L. R. AVERY

Purge Cleaner

The purge nozzles on the Carrier-Safety air conditioning system on railway cars often become obstructed by pipe scale, cinders, etc. that lodge in or against the nozzle. It is difficult, especially on the overhead systems, to trap and remove such objects due to the fact that when the pump is shut down and the pressure is released, the object will wash back down in the pipes.



For cleaning, the core guide plug shown as dotted lines in the purge nozzle is removed and replaced by the purge cleaner shown below

To overcome this difficulty, we made up the purge cleaner as shown in the attached drawing. The cleaner is made with a standard core guide plug that will fit right into the purge, and by removing the core guide plug on the purge and substituting the cleaner, the pump can be operated to maintain pressure on the purge.

The foreign objects lodged in the nozzle and the cleaning rod can be used to break them up and shove them on through the nozzle, or jam them tight in the nozzle so they will stay there until the pump is stopped so they can be removed. Those that go on through will go into the spray head and can be removed from there.

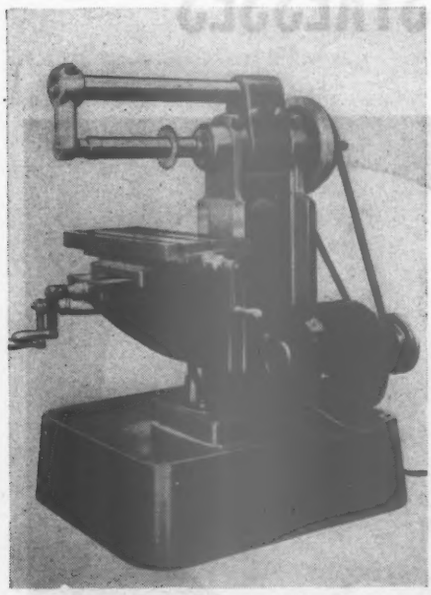
MAINTAINER

(*Turn to next left-hand page*)

NEW DEVICES

Overarm for Milling Machines

A removable overarm, that will greatly increase the versatility of combination horizontal, and vertical milling machines has been developed by the Benchmaster Manufacturing Company, 2952 West Pico, Los Angeles, Calif. Consisting of three parts, this removable overarm makes it possible to use a regular milling-machine arbor in a horizontal mill. It is readily mounted on the machine by removing the driving pulley from the rear of the horizontal spindle and slipping out the spindle itself by releasing two accessible screws.



A removable overarm increases the number of machining operations which can be done on milling machines

A heavy semi-steel casting is mounted on the horizontal spindle which holds a precision-ground stress-proof overarm carrying the outboard support. This particular attachment is useful in that it is easily attached to a machine and serves to create extra rigidity and support for arbors, boring bars, and special tools. The attachment can be used on old as well as new machines.

Balancing Compound

The Sterling Varnish Company, Haysville, Pa., has announced a material designed for the balancing of electric motor armatures, called R-943 balancing compound. It is supplied in paste or putty form, so that application can be made with the hands or with a knife. It will set in air at room temperature in about two hours to a condition such that it will not be affected by subsequent application of insulating varnishes. It does not, however, attain its maximum hardness and mechanical strength unless it is subjected to a temperature of 135 deg. C.

Although the compound was originally intended for the balancing of rotating parts, it has also been found to be effective for certain types of filling operations, such as coil margins and small interstices where good adhesive qualities, a low coefficient of expansion, and high mechanical strength are required. It is normally supplied with buff color but may be furnished in black if desired.

Adjustable Hole Cutters

A set of three adjustable hole cutters that cut all possible diameters from 5/8 in. to 3½ in. is announced by the Robert H. Clark Company, Beverly Hills, Calif. These cutters with straight shanks for use as hand tools, in portable electric and pneumatic drills, or in light drill presses are said by the manufacturer to produce accurate, clean holes that require no after-grinding, reaming or filing.

Hole cutters which can be used in hand tools or drill presses

These hole cutters are adjustable and can be easily sharpened by any competent mechanic. They may also be used in lathes and other spindle-type machines. The cutters consist of a straight shank on a hexagon body, into which are set three blades of high-speed steel at 120 deg. intervals. The three hole cutters, with an extra set of blades for each, are packed in a wooden box 3½ in. by 7¼ in. by 10 in. which is securely fastened to protect shanks, pilots, and blades when jostled around in a repair kit or mechanic's tool box.

In addition to their extreme adjustability these tools effectively cut holes in varying thicknesses of materials. For example the largest of the three tools has a capacity ranging from thin sheets to material 5/8 in. thick. The balance provided by the special three-blade design is said to make it possible to cut holes [in] curved or irregular surfaces such as pl[ates] or tubing.

Shanks are heat treated and the thr[ee] blades are precision-ground high-spee[d] steel. The smallest of the three cutte[rs] has a 3/8-in. straight shank, cuts hol[es] 5/8 in. to 1¼ in. in diameter, and is equipp[ed] with a ¼-in. drill pilot. The second si[ze] has a ½-in. straight shank and cuts [all] diameters of holes between 1 in. and 2½ in. The largest hole cutter in the set h[as] a ½-in. straight shank or No. 2 Mor[se] taper and covers all diameters betwee[n] 2 in. and 3½ in. The hardened and grou[nd] pilots on the larger size tools are remov[a]able and may be replaced with lead dri[lls] if desired.

Generators For Gas-Engine Drive

Direct-current engine generators have bee[n] made available in sizes from 1 to 200 kw., for direct assembly to the engine fram[e] or for belted drive, by the Century Electric Company, St. Louis, Mo. They are built for voltages ranging from 15 to 600 volts for a wide variety of applications. The generator is constructed to bolt directly to the engine housing and engine shaft. It is equipped with one ball bearing. The engine end of the rotor is supported by the engine bearing.

The generators are available in sizes from 1 to 200 kw.

Lubricator for Power Reverse Gear

Joseph Sinkler, Inc., Chicago, in collaboration with the Goetz-Voss Corporation, Milwaukee, Wis., the inventors, has developed a mechanical lubricator especially designed to supply adequate lubrication for power reverse gears on road locomotives assigned to long high-speed runs and for switching power. This J-S No. 44 lubricator is designed to take the place of an ordinary oil cup which holds only a few

(Continued on next left-hand page)

NICKEL PLATE increases to 40 ITS FLEET OF LIMA 2-8-4S

To aid in handling its tremendous volume of traffic, the Nickel Plate Road has recently placed in service fifteen additional 2-8-4 freight locomotives built by the Lima Locomotive Works, Inc.

This makes a total of FORTY Lima Locomotives of this type now in use on the Nickel Plate, which are hauling heavier trains at higher speeds to meet wartime demands.

LIMA LOCOMOTIVE WORKS INCORPORATED

LIMA LOCOMOTIVE WORKS INCORPORATED, LIMA, OHIO

teaspoonfuls of oil and feeds out quickly. The new lubricator holds one pint of oil and, on extended locomotive runs, will ordinarily lubricate a power reverse gear from 1,000 to 1,500 miles. The lubricator operates only when the reverse gear works, and the attendant supply of an adequate amount of oil just when and where it is needed tends to minimize reverse-gear creep and reduce maintenance costs.

The lubricator consists of a small and compact air-operated pump unit which extends into an oil reservoir casting and is secured firmly to it by four small screws through the flange, only two of these screws being shown in the illustration. The lower outlet from the pump unit has a ⅜-in. pipe connection to the exhaust line and the ⅜-in. upper outlet is piped to the air inlet of the reverse gear operating valve. Each time this valve exhausts, therefore, the pump plunger and oil piston move inward, forcing a small amount of oil past a ball check valve and into the flow of air to the reverse gear.

As soon as the exhaust pressure ceases, a spring returns the plunger and oil piston to its original position, drawing an equivalent amount of oil from the reservoir past another ball check valve into the small oil cylinder ready for the next stroke. The length of the piston stroke, which controls the amount of oil delivered, is adjustable by means of the small screw and locknut shown at the left end of the oil pump unit. This unit is easily removable for inspection or repairs.

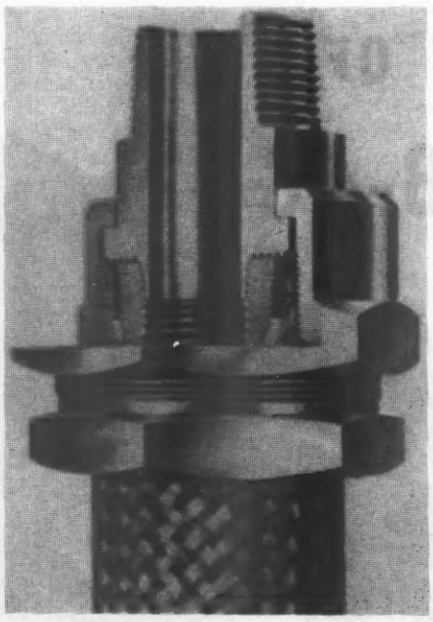
A power reverse gear lubricator designed to minimize gear creep and wear

Detachable Coupling For Flexible Hose

A detachable brass coupling for helical flexible metal hose in sizes from ¾ in. to 1½ in. inside diameter has been developed by the Packless Metal Products Corp., New Rochelle, N. Y., which offers the advantage of being mechanically self-sealing. No brazing is employed so there is no heating of the hose to weaken it at the point where flexing and vibration create the greatest strain.

The unit consists of only four parts: a nut, stem and split ring. When assembled the convolutions of hose and the metal braid are securely held by pressure between the members. The coupling withstands pressure tests of up to 800 lb.

A further feature of design is the self-contained union which permits the pipe thread end of the coupling to be screwed directly into the machine fitting and the union tightened without twisting the hose. This coupling has additional advantages in that it can be reused and is easily assembled with ordinary shop tools.



A detachable brass coupling for flexible metal hose which is easily applied and can be reused

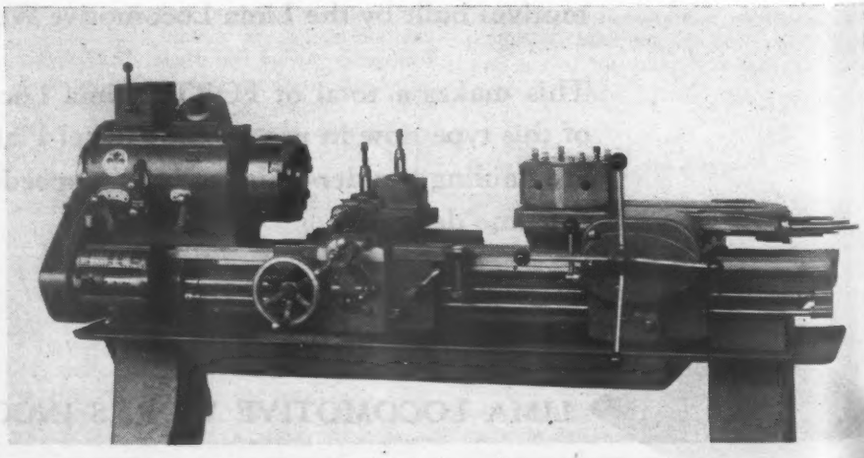
Ram Type Bed Turret

A hexagon-bed turret is now supplied on the 13-in. and 15-in. Regal lathes manufactured by the R. K. LeBlond Machine Tool Company, Cincinnati, Ohio. It is available with power feed or hand feed. An exceptionally large turret, 9 in. across faces, contributes to a considerable longer life in alignment and accuracy. It is a six-station head, supported on double preloaded adjustable precision roller bearings, rolling on a large bearing face.

The bearings are automatically lubricated and adjustable for clearance. The turret block is automatically indexed to the next station when the ram is returned against the indexing trip by the pilot wheel, or it can be spun by hand to any face of the turret in either direction. The forward feeding motion of the ram is automatically disengaged when the stop screws move against the trip. The total length of travel of the ram with either hand or power feed is 6¼ in. The face dimensions of the turret are 3¼ in. by 4½ in. The bored hole in the full range of feeds (.0025 to .144) is available and selected quickly by the quick-change feed box. The apron has positive feed, automatic forced lubrication and a safety device on the feed rod that releases the feed when undue pressure is put on the tool or some obstruction gets in the way of the forward movement of the ram.

The saddle casting takes the same bearing on the ways as the tailstock. The turret lock bolt has hardened and ground flat taper faces on both sides to hold the turret on center. When wear occurs, the bolt moves forward freely and seats solidly like a wedge, without lifting the turret. A rigid preloaded lock bolt, trunnion and base makes it unnecessary to provide a clamp to hold the ram when the tools are feeding into the work. However, the ram can be clamped against backward movement when a center is placed in a turret hole and the lathe is used for turning instead of exchanging the turret for the tailstock.

When the turret is put on the lathe at the factory, the holes in the turret can be bored to customer's specifications up to 1 in. The turret will take No. 2 tools projecting 9½ in. The distance from the end of the spindle nose to the face of the turret with the end of the saddle flush with the end of the bed on a 6-in. bed lathe is 40 in.



Hexagon bed turret with automatic indexing

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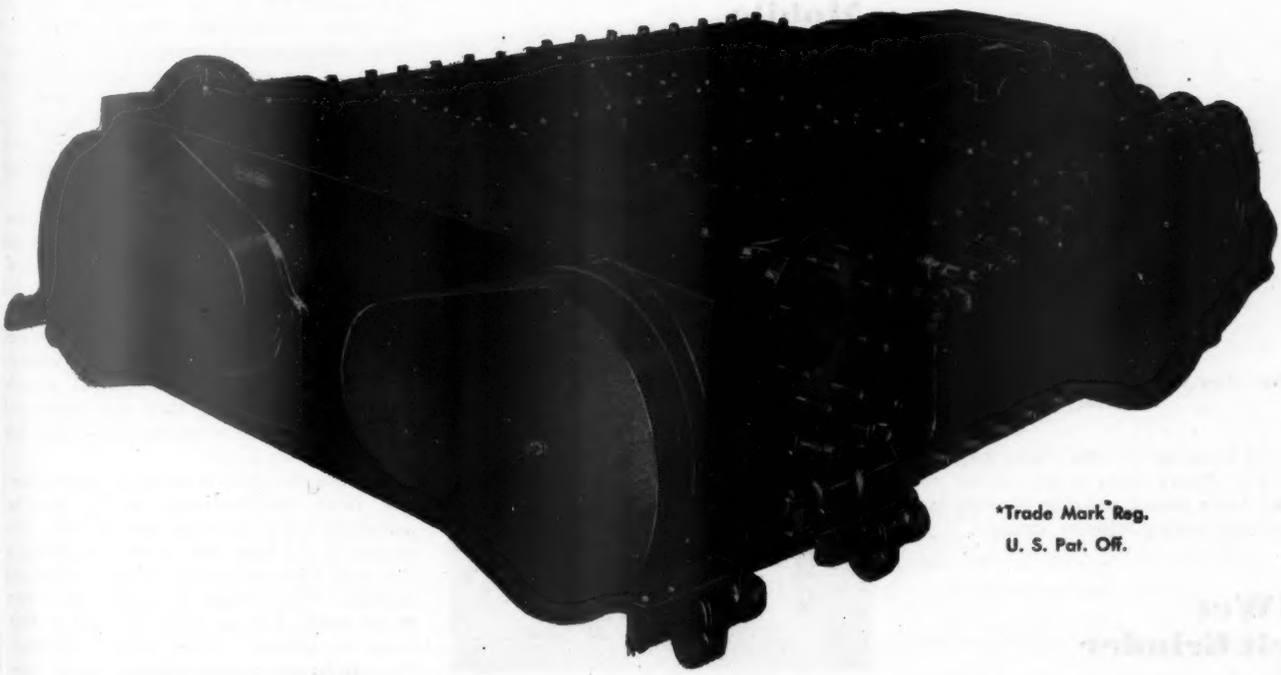
Expressly designed for today's conditions



*Trade Mark Reg. U. S. Pat. Off.

the New Type "E" Booster*

Recognizing the trend in locomotive design toward higher boiler pressures, and noting the many new factors in current steam locomotive operation, the new Type "E" Booster has been developed expressly to meet today's conditions. Its short cut-off takes full advantage of the expansive properties of the steam and effects marked economies in steam consumption. A special starting feature enables the new Type "E" Booster to develop full initial starting effort, and a new air control assures efficient Booster operation, and engagement at higher speed.

In every element, the new Type "E" Booster has been designed to conform directly to the new conditions under which it is to serve.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.
NEW YORK • CHICAGO
In Canada: FRANKLIN RAILWAY SUPPLY COMPANY, LIMITED, MONTREAL

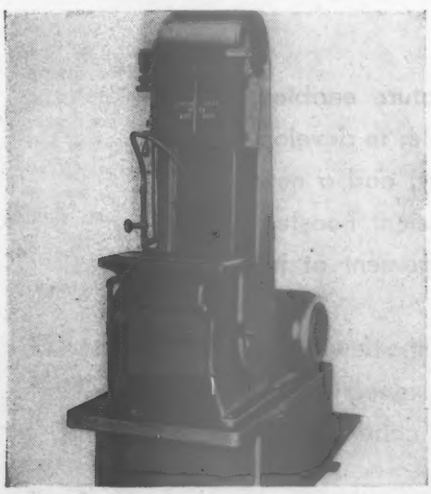
Voltage Tester

A voltage tester that tests without lamps, gives positive voltage identification and distinguishes between alternating and direct current, is offered by Square D Company, Detroit, Mich. A.c. voltage markings are 110, 220, 440 and 550. D.c. markings are 125, 250, and 600. Frequencies can be determined by the vibrations of the indicator. The device is housed in a cylindrical fibre case. The leads are 24-in. long, with double-thickness, rubber insulation vulcanized to the wire and are terminated with test prods having 4-in. fibre grips. A peg and spring assembly prevents sharp bending and breaking of leads where they enter the case. Sharp spear points on the ends of the leads permit piercing of wire insulation for testing without damage.

Scales show voltage and vibration indicates frequency

A Wet Belt Grinder

A wet belt grinder equipped with a 35-gal. self-contained recirculating pump system to provide an abundance of coolant has been introduced by the Porter-Cable Machine Company, Syracuse, N. Y. Close tolerances, often to .0005 in. are said to be possible on this machine even with inexperienced operators. Other new features include a readily accessible waste clean-out drawer; "joggle" type switch for easier tracking of belts; higher table for greater convenience of the operator; flexible tube to provide coolant where it is needed in greater quantity, and greater platen grinding area.

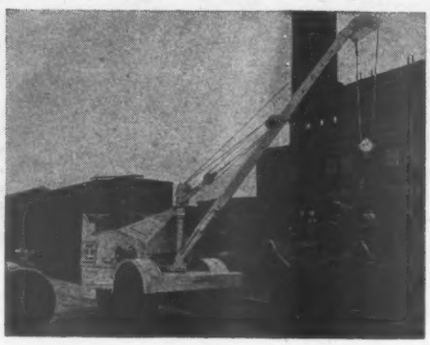


A wet belt grinder which can be used for grinding a wide variety of materials

The Type AG-8 which is illustrated, is used for grinding steel, aluminum, bronze, magnesium, glass, plastics, fibre, hard rubber, ceramics, etc. Such hazards as heating, warping, discoloring, flowing and chipping of material being round are said to be eliminated.

Mobile Crane-Loader

A compact loader, mounted on driven front wheels and a rear caster, is capable of lifting up to five tons with its telescopic 12- to 18-ft. boom, carrying loads at speeds up to 12 m.p.h. and swinging a full load 90 deg. to either side without need for outriggers according to the manufacturers, The Jaeger Machine Company, Columbus, Ohio. It can turn in as little as 10½ ft. and pass through a 6½-ft. by 8-ft. doorway. A maximum drawbar pull of 6,500 lb. is available for spotting cars. The boom load is centered on driven front wheels to give maximum stability and traction. Four transmission speeds are provided for all boom operations and travel.



Utility crane car for use in shops and yards

All boom operations may be controlled separately or simultaneously. An internal expanding friction clutch of the same type used in the largest shovels and cranes controls boom hoisting and stopping with finger pressure. Instant automatic safety brakes are provided and no part of the load or boom is ever above the operator.

Flexible Insulating Varnish

The Sterling Varnish Company, Haysville, Pa., has developed a flexible insulating varnish called R-851. It is designed for applications that demand lead wire flexibility in addition to high mechanical strength. The varnish shows little progressive hardening when the dried film is exposed to the air and it is further recommended for coating armature and stator coils that will be stored for long periods before assembly. It is a clear baking varnish which dries throughout when baked at a temperature of 135 deg. C. The dried insulation is oilproof and affords a protection that is water, acid, and alkali resistant. It is particularly recommended for electrical equipment wound with glass-covered wire designed to operate at high temperatures.

Plastics Used In Safety Goggles

Two acetate safety goggles, made extremely light in weight without sacrificing strength, are announced by the American Optical Company, Southbridge, Mass. Developed after much experimentation for general industrial use, the plastic goggles are good looking, meet exceptionally high standards of eye protection, and because of their lightness will satisfy those workers who sometimes are negligent about wearing heavier-type goggles.

In view of their good fitting properties, the goggles are ideal for workers who wear non-prescription safety glasses, and especially so for those men with defective eyesight who must wear super armorplate lenses ground to their own prescription. They are recommended for the worker whose skin is sensitive to metal goggle frames. Spark-proof, they are suggested for operations where sparks can cause fire or explosions.

The goggles have a stronger, more massive front than ordinary acetate goggles patterned after zylonite spectacles. The groove in the lense rim is deep, forming a lens seat with substantial backing to resist impact. The bridge is made of extra heavy stock, with a slight amount of face form to provide added side protection. Nose pads, also made of heavy stock, have well rounded edges and ample flare to withstand jolts and blows without digging into the face of the wearer. If properly fitted, the comfort cable temples will hold the goggles snugly in position, thus preventing any tendency for them to slide forward.

Goggles made of plastic materials are available in a number of styles

One of the goggles is available in a pink crystal color with white or Calobar six-curve super armorplate lenses. The second model is fitted with side shields and comes in a pink crystal color with white six-curve super armorplate lenses or in a green color with Calobar six-curve super armorplate lenses.

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NEWS

A. S. M. E. Semi-Annual Meeting To Be Held at Pittsburgh

RAILROADS, fuels, steel, metals, processes, tools, aviation, and management will be the topics for discussion at the semi-annual meeting of the American Society of Mechanical Engineers to be held at the Hotel William Penn, Pittsburgh, Pa., June 19 to 22, inclusive. Twenty-seven sessions are planned. Col. J. Monroe Johnson, director, Office of Defense Transportation, Washington, D. C., will be the speaker at an evening session of the Railroad Division, following a dinner of that Division. At another session the Metals Engineering Division and the Railroad Division will collaborate in a study of structural materials for railroads, including light metals and ferrous alloys. The program for the Railroad Division sessions is as follows:

TUESDAY, JUNE 20

2:30 p.m.

Metals Engineering—Railroad

Trends in the Material in Railway Car Construction, S. H. Badgett, Pressed Steel Car Company, Pittsburgh, Pa.

Structural Material for Railroads, H. W. Gillett and F. L. Hoyt, Battelle Memorial Institute, Columbus, Ohio.

Use of Aluminum in Railway Construction, A. H. Woolen, Railway Division Engineer, Aluminum Company of America, Pittsburgh, Pa.

Draft Gear Action in Train Service, O. R. Wikander, M. E., Ring Spring Department, Edgewater Steel Company, Pittsburgh, Pa. (To be presented by title.)

8:00 p.m.

Railroad

Railroads, Col. J. Monroe Johnson, director, Office of Defense Transportation, Washington, D. C.

The A. S. M. E. semi-annual dinner will be held on Wednesday evening, June 21, at the William Penn. The speaker will be Igor I. Sikorsky, engineering manager, Sikorsky Aircraft, Bridgeport, Conn., who will address the members on the subject of Direct Lift Aircraft.

Connors Succeeds Beyer as Transport Personnel Director

E. J. CONNORS, vice-president in charge of operation of the Union Pacific, has been appointed director of the Division of Transport Personnel, Office of Defense Transportation, succeeding Otto S. Beyer, who resigned on May 15. Mr. Connors will be on leave from U. P. while serving with ODT.

Mr. Beyer had held the post of director since the Division of Transport Personnel was established early in 1942 at the time the basic ODT organization was completed. He had previously served on the National Mediation Board for six years, and had been associated with the late Director Eastman when the latter was Federal Coordinator of Transportation.

Mr. Beyer's plans for the future were not disclosed beyond the explanation that he has been wanting to engage in other activities, and to complete some task left unfinished when he joined the ODT staff.

Shop Construction

Chicago, Burlington & Quincy.—Two contracts have been awarded as follows for the construction of a passenger Diesel repair shop at Fourteenth street, Chicago, with concrete foundation, steel frame and transite siding: A contract amounting to about $15,000 to G. A. Johnson, general contractor, Chicago, for the construction of concrete pits, floors and walls and for rearranging oil storage facilities; and a contract amounting to about $55,000 to the Vierling Steel Company, Chicago, for taking down the steel frame of an old car shop at Galesburg, and the refabrication and erection of this steel for the new repair shop, together with the transite siding.

Chicago, Rock Island & Pacific.—A contract has been awarded the Stark Building Company, Cedar Rapids, Iowa, for the construction of a new, fully-equipped brick enginehouse in that city, consisting of 12 stalls 115 ft. long. This work will cost more than $110,000.

O. P. A. Car Builders Advisory Committee

MEMBERS of the recently appointed industry advisory committee representing railroad car builders have held an organization meeting and discussed provisions of the price regulation affecting the industry with officials of the Office of Price Administration, the O. P. A. announced on May 4.

The industry group selected the following officers: Chairman, T. P. Gorter, of Pullman Standard Car Manufacturing Company, Washington, D. C.; vice chairman, R. A. Williams, of American Car & Foundry Company, New York, and secretary, W. C. Tabbert, of American Railway Car Institute, New York.

Other members of the committee are: J. F. Clary, E. C. Budd Manufacturing Company, Philadelphia, Pa.; K. C. Gardner, Greenville Steel Car Company, Greenville, Pa.; R. L. Gillspie, Bethlehem Steel Company, Bethlehem, Pa.; B. C. Hanna, Ralston Steel Car Company, Columbus, Ohio; Leslie E. Hess, J. G. Brill Company, Philadelphia, Pa.; J. F. MacEnulty, Pressed Steel Car Company, New York; Edwin B. Meissner, St. Louis Car Company, St. Louis, Mo.; Lester North Selig, General American Transportation Corporation, Chicago; A. Van Hassel, Magor Car Corporation, New York; L. C. Wilkoff, Youngstown Steel Car Corporation, Niles, Ohio; W. F. Wieland, Mt. Vernon Car Manufacturing Company, Mt. Vernon, Ill.

Orders and Inquiries for New Equipment Placed Since the Closing of the May Issue

LOCOMOTIVE ORDERS

Road	No. of Locos.	Type of Locos.	Builder
Bangor & Aroostook	1	2-8-0	American Loco. Co.
	1	4-8-2	American Loco. Co.
Richmond Fredericsburg & Potomac	10	4-8-4	Baldwin Loco. Wks.

FREIGHT-CAR ORDERS

Road	No. of Cars	Type of Car	Builder
Atlanta & West Point	25	Box	Pull.-Std. Car Mfg. Co.
Florida East Coast	50	50-ton box	Gen. Amer. Trans. Corp.
Georgia R. R.	100	Hopper	Pull.-Std. Car Mfg. Co.
	75	Box	Pull.-Std. Car Mfg. Co.
Illinois Terminal	200	50-ton box	American Car & Fdry. Co.
Inland Steel Co.	75	100-ton flat	Gen. Amer. Trans. Corp.
New York Central	3,000	55-ton box	Despatch Shops, Inc.
Wheeling & Lake Erie	500	50-ton box	Ralston Steel Car Co.
	500	50-ton gondola	Bethlehem Steel Co.
Weirton Steel Co.	75	100-ton mill flat	Gen. Amer. Trans. Corp.

PASSENGER-CAR ORDERS

Road	No. of Cars	Type of Car	Builder
New York Central	153[1]		Pull.-Std. Car Mfg. Co.
	127[1]		Edw. G. Budd Mfg. Co.
	20[1]		American Car & Fdry. Co.

PASSENGER-CAR INQUIRIES

Road	No. of Cars	Type of Car	Builder
Seaboard Air Line	15	Coaches	
	6	Dining	
	4	Pass.-bagg.	

[1] For delivery when material is released by WPB.

NOTE: The Pacific Fruit Express plans to spend $5,500,000 in 1944 for the purchase of 1,000 refrigerator cars and $9,000,000 for the general repair and maintenance of existing equipment.

Equipment Orders and Installations

CLASS I railroads on April 1 had 36,727 new freight cars on order, according to the Association of American Railroads. On the same date last year, they had 20,712 on order.

This year's April 1 total included 15,815 hopper, 4,230 gondolas, 800 flat, 11,386 plain box cars, 3,150 automobile box cars, 1,146 refrigerator, and 200 stock freight cars.

The Class I roads also had 755 locomotives on order on April 1, compared with 386 on the same day in 1943. The former figure included 243 steam, two electric and 510 Diesel-electric locomotives, contrasted with 392 steam, 12 electric and 182 Diesel-electric locomotives one year ago.

Class I roads put 7,838 new freight cars in service in the first three months this year compared with 4,657 in the same period last year. Those installed in this year's first three months included 4,494 hopper, 524 gondola, 715 flat, 358 automobile box, 1,693 plain box, and 54 refrigerator freight cars.

They also put 261 locomotives in service in the first quarter of 1944, of which 112 were steam, one electric and 148 Diesel-electric. Locomotives installed in the first three months of 1943 totaled 159, of which 125 were steam, 6 electric and 28 Diesel-electric.

Mechanical Division, A. A. R.

Journal Bearing Materials

Supplementing Bulletin 4, issued on February 22, 1943, by the A. A. R. Committee on Journal Bearing Development, a new Bulletin No. 5 has been released covering the further work of this committee in investigating the possibility of savings in strategic materials by changes in the design and composition of journal bearings. The conclusions, based on carefully conducted tests and specified procedures, are given by the committee in the following:

(1) Any of the bearings tested, having lead-base lining materials, regardless of design or composition, perform satisfactorily as long as they are running on the lining.

(2) Considering the journal-box assembly as a whole—i.e., the axle, lined bearing, wedge and box—major changes in composition and construction of the bearing can be made without materially affecting the dissipation of the frictional heat generated within the assembly.

(3) The performance of an aluminum-alloy insert in a composite bearing indicates the advisability of further investigation of materials which have heretofore not been considered as bearing metals.

Snubber Application to Tank Cars

The A. A. R. Mechanical division, has tabulated replies to a questionnaire on the status of application of snubbers to truck spring clusters on privately owned tank cars and finds that, as of March 1, 1944, out of a total of 140,441 cars, owned by 395 companies, 100,292 cars, or 71.4 per cent are equipped and 2,509 were applied during the month of February. An analysis of the tabulation indicates that 159 companies, owning 9,559 cars, are 100 per cent equipped and, on the other extreme, 43 companies, owning 576 cars, have no program. One company, namely the City Service Oil Company, CSOX EORX, no longer authorizes railroads to apply spring snubbers to their cars.

Geared Hand Brakes

The list of manufacturers awarded certificates of approval under date of February 18, 1944, as noted on page 192 of the April issue of the *Railway Mechanical Engineer*, has been superseded by another dated April 24. In addition to those companies already listed in the April issue the new list includes the Union Asbestos & Rubber Company (Equipment Specialties Division), drawing 3450-A.

Swiss Steam Locomotives Use Wood for Fuel

Switzerland, with all of its electrified railroads, still uses steam locomotives on certain of its lines which have not been converted to electric operation, but the ever-current problem of providing fuel is now aggravated by wartime conditions.

Because of the acute coal shortage, the Swiss Federal Railways have been obliged to fire locomotives with wood—coal being used to fire them up, wood to keep them going. Some steam locomotives have been equipped with electrically-heated boilers and pantograph current collectors, the necessary power for generating steam being taken from the overhead contact wire.

The government-owned railways have given considerable study to the use of wood for fuel, but it is their intent to complete electrification of all lines as quickly as possible. At present, over 90 per cent of their total traffic is handled electrically.

Electrically sawed blocks of 3¼- and 1½-ft. lengths are used for firing Swiss locomotives

High Safety Honors to Railroad Men

In contrast to the showing made by other industries, the railroads have supplied 15 per cent of the "Safety Aces" selected by the National Safety Council for the program "Men, Machines and Victory" broadcast over the Blue Network since January 15, 1943. This is at the rate of one man for each 11 of the 170 railroad members, compared with one man for each 106 of the 5,830 industry members.

Since January 15, 1943, 65 Aces have been selected, of whom 10 have been railroad employees. Of the 6,000 companies that are members of the Council, only 170 are railroads.

A study of the records of the 10 railroad employees reflects, not only a personal interest in the practice of safety, but an inventive genius for safety aids born of a desire to remove the causes of accidents and be helpful to fellow workers. The 10 railroad aces selected to date are as follows:

Ronald F. Olds, February 26, 1943, lead sheet metal worker on the Missouri Pacific at North Little Rock, Ark. Encouraged the use of safety shoes and prevailed upon workers to realize the danger of grease-saturated clothing in welding operations.

George Gibson, March 30, 1943, supervisor of the woodmill of the Pullman Company at Pullman, Ill. Invented several guards for wood working machines. His department operated 13 years and 170 days without a lost time accident.

George Snyder, April 13, 1943, of the air brake department of the Great Northern at Spokane, Wash. Designed devices which reduced the hazard of handling couplers and hanging doors.

Stanley LéGrande, June 22, 1943, a millman on the Illinois Central at Mattoon, Ill. Displayed special interest in safety and devised several devices for preventing accidents on machines.

E. L. Burton, July 20, 1943, foreman for the Atchison, Topeka & Santa Fe at Bakersfield, Calif. Devised wheel truck benches, a safety angle lug for locomotive oil tank manhole covers and a device for holding in place the deck on locomotive cabs and thereby reduced accident hazards.

George Traus, August 30, 1943, machinist leader in the Sayre locomotive shops of the Lehigh Valley at Bethlehem, Pa. Devised an eye shield and metal guards for planers and saws and a portable folding curtain for welding operations which envelops the welder and shields the flash for other welders.

Kenneth Glassmann, September 30, 1943, tank truck foreman in the Denver, Colo., shops of the Union Pacific. Designed a split window for locomotive cabs to eliminate exposure to drafts, several safety devices for shops, and ventilation for welding.

Martin C. Petersen, November 22, 1943, assistant enginehouse foreman on the Union Pacific at Green River, Wyo. Had a long record for conducting safety meetings successfully and perfected several devices for preventing accidents in shops.

John J. Lang, November 29, 1943, locomotive engineman on the New York, New Haven & Hartford at New Haven, Conn. Had an excellent record of performance as an engineman and on three specific occasions showed rare judgment which prevented possible serious train accidents.

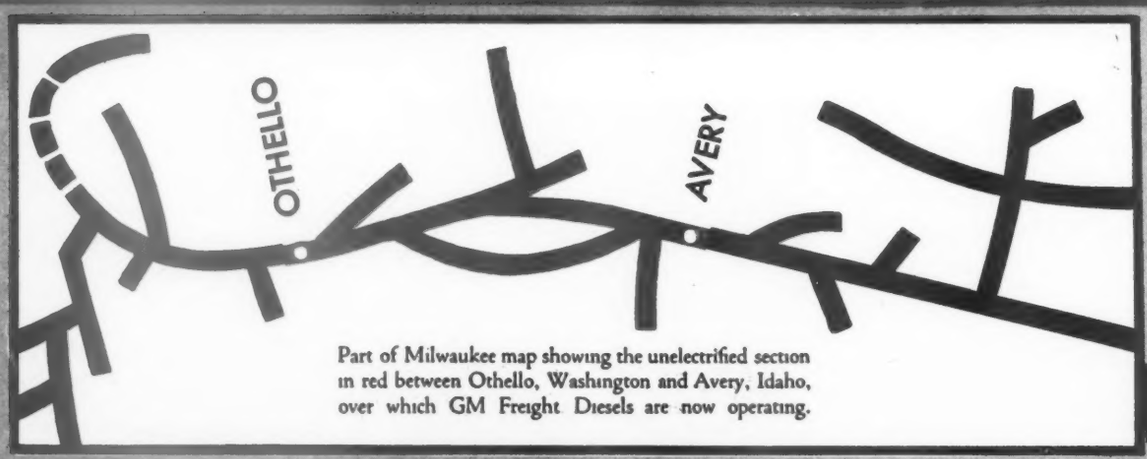
W. E. Buck, January 24, 1944, locomotive shop superintendent on the Michigan Central at Jackson, Mich. Was especially active in preventing injuries and deaths among fellow workers. In the seven years, 1937 to 1943, in which he was general foreman or superintendent, the casualty rate per million man-hours worked for his department averaged 3.60, while in one year it was zero.

C. & N. W. Depreciation Rates

Equipment depreciation rates for the Chicago & North Western are among those prescribed by the Interstate Commerce Commission in a recently issued series of sub-

(*Continued on second left-hand page*)

Bridging the
with GM FRE



Part of Milwaukee map showing the unelectrified section in red between Othello, Washington and Avery, Idaho, over which GM Freight Diesels are now operating.

CHICAGO MILWAUKEE ST. PAUL AND PACIFIC

GENERAL MOTORS LOCOMOTIVES

ELECTRO-MO

GENERAL MOTORS CORPORATION

...IT DIESELS

BETWEEN the two sections of the Milwaukee Road's electrified line in the Rocky and Cascade Mountains, totaling 656 miles, there remained a very difficult 226-mile mountain division from Avery, Idaho to Othello, Washington, full of grades and curves necessitating many slow-downs. The wartime need for faster freight movements brought this condition into unusual prominence and Milwaukee officials were quick to seek a remedy. They found the answer in two 5400 Hp. GM Diesel Freight Locomotives, which now bridge the gap between the two electrified sections without congestion and with such dispatch that if heavier war needs arise additional tonnage can be handled. Additional GM Freight Diesels now on order will prove invaluable in postwar rehabilitation.

The Milwaukee is now operating GM Diesels in all three classes of service — switching, passenger and freight.

★ *LET'S ALL BACK THE ATTACK — BUY MORE WAR BONDS* ★

orders in the general proceeding, "Depreciation Rates for Equipment of Steam Railroad Companies."

The C. & N. W. rates are: Steam locomotive, 3.32 per cent; streamline train motive power, 6.6 per cent; Diesel-electric switchers, 4.89 per cent; freight-train cars, 3.85 per cent; streamline passenger-train cars, 6.6 per cent; conventional type passenger-train cars, 3.11 per cent; work equipment, 3.53 per cent; miscellaneous equipment, 13 per cent.

Supply Trade Notes

OKADEE COMPANY; VILOCO RAILWAY EQUIPMENT COMPANY. — *Charles G. Learned,* vice-president of the Okadee Company and of the Viloco Railway Equipment Company, of Chicago, has been elected first vice-president of these companies. *Edwin L. Cull,* formerly of the engineering department of the Okadee Company and the Viloco Railway Equipment Company, has been appointed mechanical engineer of the two companies. Mr. Cull was formerly with the Illinois Central.

◆

UNION CARBIDE & CARBON CORPORATION. —*Fred H. Haggerson,* vice-president and director of the Union Carbide & Carbon Corporation, has been elected president, with headquarters at New York, to succeed *Benjamin O'Shea,* who becomes chairman of the board. Mr. Haggerson was born at Spalding, Mich., in 1884 and is a graduate of the University of Michigan Law school. He entered the service of the

Fred H. Haggerson

Union Carbide & Carbon Corporation following World War I. He became vice-president in 1938 and a director in 1941.

◆

PITTSBURGH STEEL COMPANY.—*W. G. Gray* has been appointed railway development engineer of the Pittsburgh Steel Company, with headquarters in Chicago. For the past three years Mr. Gray had been master mechanic of the Virginian. Prior to that he was with the Association of American Railroads, the Union Pacific, and the Lehigh Valley.

◆

ELECTRIC STORAGE BATTERY COMPANY.—*C. F. Norberg* has been elected vice-president in charge of manufacturing of the Electric Storage Battery Company.

A. M. BYERS COMPANY.—*H. R. Rowland* has been appointed manager of wrought-iron hot-rolled sales of the A. M. Byers

H. R. Rowland

Company. Mr. Rowland was formerly manager of the Pittsburgh, Pa., division and has been associated with the Byers organization since 1915. *M. C. Morgan,* assistant to Mr. Rowland at Pittsburgh, has been appointed to succeed him as head of that division. Mr. Morgan has been with the company since 1923.

◆

AMERICAN CAR AND FOUNDRY COMPANY. —*L. P. Philp,* formerly assistant to the president, has been appointed assistant to the chairman of the American Car and Foundry Co. Mr. Philp joined the company in 1939, having served previously as division manager of the Westinghouse Electric Supply Company of New Jersey and president of the Electrical League in that state.

◆

AMERICAN STEEL & WIRE COMPANY.—*George H. Rose,* chief engineer of the American Steel & Wire Co., Cleveland, Ohio, has been elected vice-president and has been succeeded by *Eugene J. Reardon,* assistant chief engineer. *W. O. Everling,* assistant director of research, has been appointed director of research, succeeding J. S. Richards, deceased. *R. H. Barnes,* division metallurgist, succeeds Mr. Everling as assistant director of research.

Army-Navy "E" Awards

American Car and Foundry Company, Chicago. May 10.

Buda Company, Harvey, Ill. April 27.

BOWSER, INC.—Bowser, Inc., has set up a new and enlarged railroad division to supply railroads with equipment for handling liquids. *Harry B. Thoreson* has been appointed special railroad representative for the Chicago area.

◆

GRAYBAR ELECTRIC COMPANY.—*Edward J. O'Donnell* has been appointed manager of the railroad department of the Graybar Electric Company. He will continue to make his headquarters in Chicago.

◆

COPPERWELD STEEL COMPANY.—*N. H. Brodell,* formerly metallurgical sales engineer, has been appointed Cleveland, Ohio, district manager for the Copperweld Steel Company.

◆

LOCKHART IRON & STEEL COMPANY.—*D. M. Stembel* has been named vice-president of the Lockhart Iron & Steel Com-

D. M. Stembel

pany. Mr. Stembel was formerly manager of hot-rolled sales for the A. M. Byers Company.

◆

BUDA COMPANY.—*Harry L. Wolfe,* for 19 years supervisor of sales in the Chicago and eastern territory for the Lehon Company, has joined the railroad division of the Buda Company. Prior to his association with the Lehon Company, Mr. Wolfe was supervisor of fuel of the Chicago, Milwaukee, St. Paul & Pacific.

◆

GLIDDEN COMPANY.—*P. L. Lotz,* advertising and sales promotion manager of the paint division of the Glidden Company, Cleveland, Ohio, has been transferred to California for special sales work with the Pacific Coast division.

FRANKLIN RAILWAY SUPPLY COMPANY.—*John E. Long,* for the past five years western sales manager of the Franklin Railway Supply Company with headquarters at Chicago, has been appointed general sales manager of the company, with headquarters in New York. Mr. Long was graduated from Purdue University with a degree in mechanical engineering in 1923. He began his career with the Lima Locomotive Works in that year and during the next eleven years was employed in the calculating, service, engineering and sales departments. He entered the Chicago office of the Franklin Railway Supply Company

John E. Long

in 1934 and was appointed western sales manager in 1939.

William T. Lane, assistant western sales manager, has been appointed western sales manager to succeed Mr. Long at Chicago. Mr. Lane began his career with the Franklin Railway Supply Company as a draftsman and was subsequently appointed chief draftsman and mechanical engineer. He joined the sales department as district manager of the Pacific Coast territory and later was moved to Chicago as assistant western sales manager.

◆

NATIONAL TUBE COMPANY; TUBULAR ALLOY STEEL CORPORATION.—*E. N. Sanders,* who for the last 20 months has served as vice-president in organizing the Tubular Alloy Steel Corporation, Gary, Ind., has resumed his position as vice-president in charge of operations of the National Tube Company, Pittsburgh, Pa. *Leo J. Mason,* general superintendent of the Ellwood City, Pa., works of the National Tube Company, has been elected vice-president of the Tubular Alloy Steel Corporation.

◆

CLIMAX MOLYBDENUM COMPANY.—*V. A. Crosby,* who has been associated with the Climax Molybdenum Company for the past 10 years as metallurgical engineer and sales representative, has been placed in charge of a new office opened at 624 Fisher Building, Detroit, Mich., to handle sales and service work in Michigan, Indiana and the Toledo, N. Y., district. *W. G. Patton* has also been assigned to the new office in charge of the compilation and publication of technical data on molybdenum steels and irons.

BALDWIN LOCOMOTIVE WORKS.—An office to handle sales for Baldwin divisions and subsidiaries in Ohio, eastern Michigan, and the Pittsburgh district has been opened

J. D. Loftis

at 2405 Terminal Tower, Cleveland, Ohio. *C. L. Mattsson,* who has been placed in charge of the new office, will handle products sold to industries other than transportation. *J. D. Loftis* will handle sales and engineering service to the railroad field.

J. D. Loftis was educated at Utah University and Leland Stanford University. He entered the employ of the Denver & Rio Grande Western in 1928 and in August, 1942, became associated with the Office of Defense Transportation, serving as mechanical assistant; assistant to director, Division of Railway Transport, and traffic flow chief until December, 1943, when he joined the Baldwin organization.

◆

WESTINGHOUSE ELECTRIC INTERNATIONAL COMPANY.—*John W. White,* vice-president and general manager of the Westinghouse Electric International Company, has been

John W. White

elected president and general manager to succeed *George H. Bucher,* who becomes chairman of the board. Mr. Bucher is president of the Westinghouse Electric & Manufacturing Co., the parent company. *William E. Knox,* formerly assistant general manager, has been elected vice-president of the International Company.

John W. White joined the Westinghouse Electric & Manufacturing Company at its Pittsburgh, Pa., headquarters 39 years ago, and from 1907 to 1918, except for four years spent with another manufacturing company, was in the sales department in Pittsburgh, Detroit, Mich., and Chicago. He joined the Westinghouse Electric International Company in 1918, and for the following 18 years lived abroad, managing the company's affairs in the Caribbean area, in the Far East, and in South American countries. He returned to New York from Buenos Aires in 1927, when he was elected vice-president and general manager.

William E. Knox was graduated from New Hampshire University in 1921. He

William E. Knox

enrolled in the graduate student course at the Westinghouse Company's East Pittsburgh, Pa., works and a year later was transferred as a sales clerk to the New York headquarters of the Westinghouse Electric International Company. He was appointed assistant to the general manager in 1932 and assistant general manager in 1937.

◆

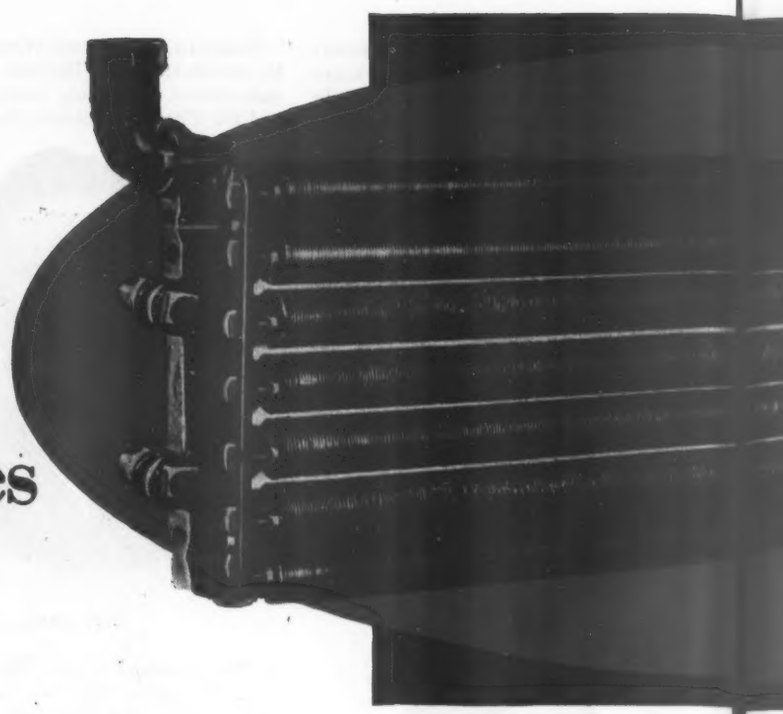
FAIRBANKS, MORSE & COMPANY.—Fairbanks, Morse & Co., Chicago, has announced comprehensive plans for the manufacture of a new line of Diesel-electric locomotives, using opposed-piston Diesel engines of the type now used by the navy for submarines and surface craft. This type of engine, developed in the 1930's, primarily for locomotive use, has been in service for over five years on the Southern in six two-car Diesel-electric trains.

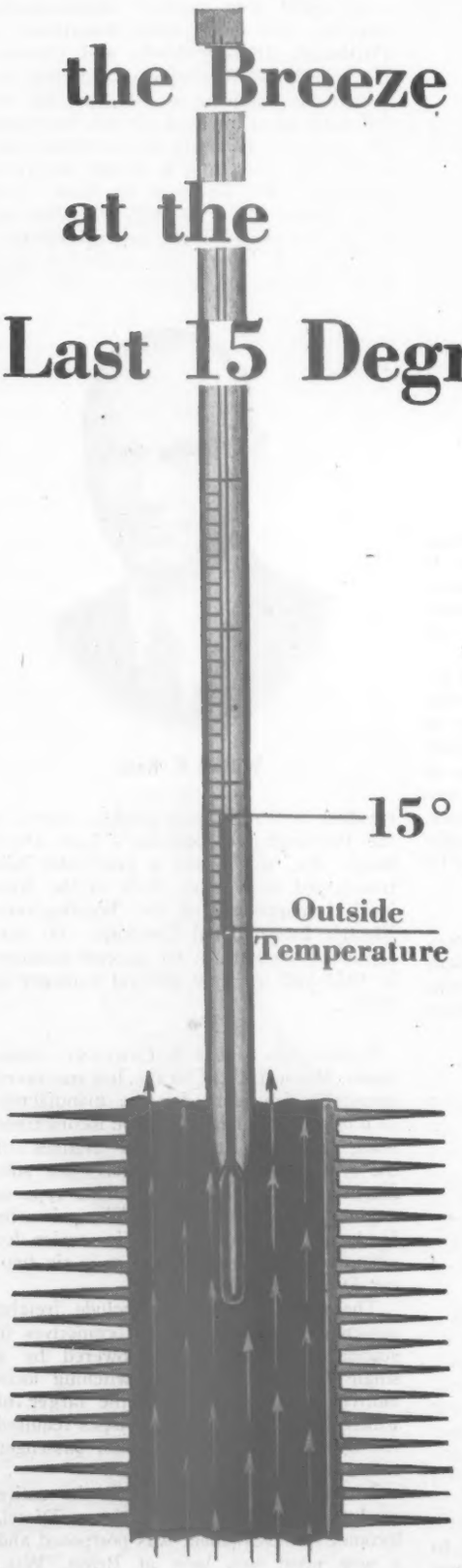
These locomotives will include freight, passenger and dual-service locomotives in standardized units, each powered by a single Diesel engine, and switching locomotives in two capacities, the larger of which will have the characteristics required for operating local freight and passenger trains as well.

Because the navy demanded the entire production of the opposed-piston Diesel, locomotive development was postponed and a new plant was built at Beloit, Wis., equipped for the mass production of this engine to meet navy needs alone. The Beloit plant now comprises 36 buildings, covering 40 acres of a 100-acre plant site, with 6,000 employees. Feeder plants for Diesel engine parts, at Freeport, Ill., and

(*Continued on second left-hand page*)

Directing the Breeze at the Last 15 Degrees





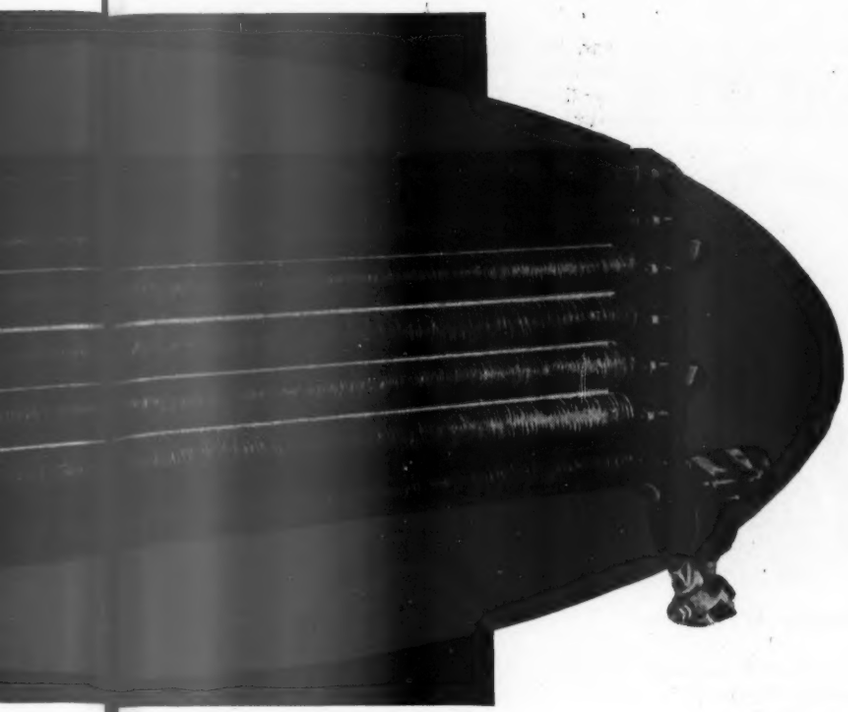
THE efficiency of an Aftercooler is gaged by its ability to cool compressed air to outside (atmospheric) temperature.

Most of the heat, generated by compressing air, is radiated in transit between the compressor discharge and the outlet of the first main reservoir. On normal installations the air is thus cooled to within fifteen degrees of outside temperature.

However, it is this last fifteen degrees that must be lured away. Small as it is, this heat can carry the harmful quantity of vapor to the brake system, even in the most arid climate.

By strategic location of a large, efficient radiating area, the Aftercooler *directs the breeze at the last fifteen degrees* and precipitates the moisture that might later freeze or saturate a single valve, and thus impair the brake functions of the train.

Westinghouse Air Brake



Air Stream Radiation

Compact Radiating Area

Finned copper tubing consolidates the largest practicable radiating area into the smallest possible space.

The compact unit comprises three times as much radiating surface as provided by iron pipe, plus the advantages of location, accessibility, and less likelihood of internal frosting.

Air Stream Radiation

Front end location exposes Aftercooler to both frontal and lateral air streams.

Full benefit of prevailing winds is gained, regardless of their direction.

Fins are scientifically spaced to avoid hot air pocketing.

Remoteness from boiler eliminates possibility of re-heating.

Company · Wilmerding. Pa.

Three Rivers, Mich., employ 1,200 more.

As soon as materials are available and labor conditions permit, additional facilities will be built as required at Beloit in order that complete locomotives may be manufactured and assembled there. In the meantime, in order to expedite production, the General Electric Company is co-operating with Fairbanks, Morse & Co. in building the initial units, which are expected to be ready for service late this year. Designs are already developed for 1,000-hp. switching locomotives, the first of which will be finished within a few months at the Beloit plant and delivered to the Chicago, Milwaukee, St. Paul & Pacific. This switcher will have Westinghouse electrical equipment, including the main generator, driving motors and controls.

John W. Barriger, III, vice-president of the Union Stock Yard & Transit Co., Chicago, has been appointed manager of the newly created Diesel Locomotive division. Mr. Barriger will direct studies of the economics of Dieselization as part of his duties of merchandising the new locomotives. Mr. Barriger was born in Texas in 1899 and was graduated from Massachusetts Institute of Technology in 1921. From 1933 through 1941, he was in charge of the Railroad division of the Reconstruction Finance Corporation, becoming associated with the Carriers' Conference Committee in the 1941 railway wage case. At its conclusion, he returned to Washington as an associate director of the Office of Defense Transportation. He resigned from the latter position upon the acceptance of the vice-presidency of the Union Stock Yard & Transit Company of Chicago. Mr. Barriger served as a reorganization manager of the Chicago & Eastern Illinois during 1940, and became a member of its board and executive committee in 1941. He retired from these offices in 1942 and subsequently became a director of the Alton.

◆

SCULLIN STEEL COMPANY.—*Harry Scullin,* president of the Scullin Steel Company, St. Louis, Mo., has been elected chairman of the board and has been succeeded by *E. F. Judge,* vice-president. *W. H. Chickey,* secretary, has been elected vice-president and controller. *William J. Monahan,* assistant secretary and assistant treasurer, has been promoted to secretary and treasurer and has been succeeded by *Edwin L. Kaiser,* cashier.

◆

AMERICAN LOCOMOTIVE COMPANY.—*Alexander M. Hamilton,* executive vice-president of the Montreal Locomotive Works, Canadian subsidiary of the American Locomotive Company, has been appointed vice-president, foreign sales, of the American Locomotive Company, as noted in the May issue. However, the portrait which accompanied the sketch therein was not of Mr. Hamilton. Mr. Hamilton joined the company in 1909 following his graduation from Cornell University with a degree in mechanical engineering. After working in the Schenectady, N. Y., plant, he was transferred to the foreign sales division in New York and, in 1915, sent to Russia to supervise the erection of locomotives sold to that country. During the first world war, he served in the United States field artillery. He returned to the American Locomotive Company and was European representative

Alexander M. Hamilton

with headquarters in Paris until 1921. He was subsequently foreign sales representative for the company in various parts of the world, and in 1942 was appointed executive vice-president of the Montreal Locomotive Works.

◆

ELASTIC STOP NUT CORPORATION.—*George L. Green* has been appointed sales manager, railroad and allied industries, for the Elastic Stop Nut Corporation. Mr.

G. L. Green

Green was graduated from Yale University in 1931. For the past ten years he has been associated with the Union Asbestos & Rubber Co., Chicago, as sales engineer, salesman and assistant vice-president, railroad sales.

◆

MINNEAPOLIS - HONEYWELL REGULATOR COMPANY.—*D. J. Peterson,* manager of the Detroit, Mich., branch of the Minneapolis-Honeywell Regulator Company, has been appointed in charge of the heating control division of the entire Cleveland, Ohio, zone. This area includes territories covered by Cleveland, Detroit, Buffalo, N. Y., Cincinnati, Ohio and Pittsburgh, Pa. Mr. Peterson has been with the Minneapolis-Honeywell Regulator Company for the past 18 years. His headquarters will continue at Detroit.

◆

HASKELITE MANUFACTURING CORPORATION.—*Davis C. Greene,* for ten years in the Detroit, Mich., sales office of the Haskelite Manufacturing Corporation, has been appointed St. Louis, Mo., representative. *Robert Burkhead* of the production department of the Haskelite plant in Grand Rapids, Mich., succeeds Mr. Greene in the Detroit office.

◆

GENERAL AMERICAN TRANSPORTATION COMPANY.—*R. W. Thompson,* chief engineer of the General American Transportation Corporation, Chicago, has been promoted to director of engineering. Mr. Thompson will direct research development activities and all engineering work of all departments.

◆

JOSEPH T. RYERSON & SON, INC.—*Harold B. Ressler,* vice-president of Joseph T. Ryerson & Son, Inc., who has been located at the company's New York plant, has been appointed in general charge of sales in all territories with headquarters in Chicago. *Ainslie Y. Sawyer,* assistant to the president, has been elected vice-president and will continue at Chicago in general charge of purchases. Mr. Sawyer recently returned from Washington where he served as deputy chief of the warehouse steel branch of the War Production Board. *Harry W. Treleaven,* assistant manager of the Ryerson New York plant, has been appointed manager of that plant which is located in Jersey City, N. J., and *Thomas Z. Hayward,* who was in charge of tubing sales and priorities, has been appointed assistant general manager of sales.

◆

PULLMAN, INC. — PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—A final judgment handed down in the Pullman anti-trust suit by a three-judge Federal District Court at Philadelphia, Pa., on May 8, ordered Pullman, Inc., to separate its sleeping-car business operated by its subsidiary, the Pullman Company, from its manufacturing business conducted by its subsidiary, the Pullman-Standard Car Manufacturing Company. "Pullman Incorporated shall," the decree states, "within 90 days after the effective date of this judgment file with the court its election to make such disposition either (a) of all its interest in the sleeping-car business, and the properties used in connection therewith, or (b) of all of its interest in the manufacturing business and the properties used in connection therewith, as will result in a complete separation of such businesses and the ownership and control thereof. At the same time Pullman Incorporated shall also submit to the Court for hearings and approval, a plan to effectuate such separation."

The final decree is the culmination of an anti-trust suit filed by the government against Pullman on July 20, 1940. It takes effect at the expiration of 60 days from May 8 unless within that time an appeal is taken, in which event it will take effect on

(*Continued on next left-hand page*)

the day on which the mandate of the Supreme Court is filed in the District Court at Philadelphia.

The decree directs Pullman, Inc., to carry out a plan of separation within one year and provides that after the separation neither of the two companies subsidiary to Pullman, Inc., may engage in the business of the other. For a period beginning with the effective date of the judgment and running until the separation, the Pullman Company must ask for competitive bids when acquiring new sleeping cars.

Any orders or contracts between Standard and any railroads, whereby Standard is to build for the railroad passenger cars for use in any train in which Pullman is to operate sleeping cars, is subject to cancellation at the option of the railroad within 60 days, except orders for cars on which construction has begun.

The decree gives contracting railroads the right to purchase used sleeping cars from the Pullman Company. The railroad must exercise the right to purchase within six months of the expiration of its sleeping-car contract. Pullman cannot without the prior consent of the Court, sell any used sleeping cars to any purchaser before the plan of separation is approved.

As long as Pullman continues in the sleeping-car business, it must, at the request of any railroad offer, upon reasonable and non-discriminatory terms, to service railroad-owned sleeping cars, provided the railroad-owned cars meet the safety standards of the Association of American Railroads. Likewise, it must furnish and service sleeping cars on any line of any railroad at the request of such railroad to the extent that cars are available, even though sleeping cars are about to be or are being furnished on other lines of the same railroad by the railroad itself or by some third party. In addition, it must furnish on request, but only to the extent that cars are available, cars to meet all or a part of the peak or seasonal demand for sleeping-car accommodations, irrespective of whether or not a railroad has a contract with Pullman. The insertion or enforcement of an "exclusive right" clause is prohibited.

Any contract or understanding between Pullman and any railroad that is in force during all or any part of the period of time beginning one year from the effective date of the judgment and ending one year after the formal termination of the present war is subject to cancellation by such railroad at any time, provided such railroad shall give to Pullman six months' notice of such cancellation. Such cancellation shall void the contract obligation, if any, of such railroad to buy the new-type lightweight cars furnished by Pullman to such railroad at its request upon the cancellation or termination of the contract.

◆

NATIONAL BATTERY COMPANY. — *Dr. George E. Hulse* has been appointed research director of the National Battery Company's Gould Commercial Division, Depew, N. Y. Mr. Hulse was formerly in charge of physical research in the general laboratory of the United States Rubber Company, at Passaic, N. J.

◆

SULLIVAN MACHINERY COMPANY.—*J. A. Drain, Jr.*, assistant to the president of the Sullivan Machinery Company, has been elected vice-president in charge of product engineering, research and development, and *O. J. Neslage*, general sales manager, has been elected vice-president in charge of sales in the United States and Mexico.

Obituary

MICHAEL J. CURTIN, general superintendent and assistant works manager of the Philadelphia, Pa., machine tool plant of the William Sellers Company, died May 7. He was 46 years of age.

Personal Mention

General

JOSEPH H. WALLIS, research associate in the radiation laboratories of the Massachusetts Institute of Technology, Cambridge, Mass., has been appointed communications

Joseph H. Wallis

engineer of the Baltimore & Ohio. Mr. Wallis has been actively associated with electronic engineering since 1933, when he became a radio engineer at Springfield, Mo. He was engaged in communication equipment and engineering at Chicago before his work at M.I.T. As communications engineer, he will undertake studies and experiments for the application of radio communication in yard operations, between stations and trains, and between train crews, looking to the speeding-up of train operations, one of the postwar projects under consideration by the Baltimore & Ohio.

A. C. MELANSON, superintendent motive power and car equipment of the Canadian National at Toronto, Ont., has been appointed works manager of the motive power

A. C. Melanson

and car shops at Montreal, Que. Mr. Melanson, who was born at Scoudouc, N. B., entered railway service as a machinist apprentice in the employ of the Canadian Government Railways at Moncton, N. B. Three years later he became a draftsman; in May, 1919, was transferred to Toronto, and in January, 1922, became material inspector, later serving at Montreal and Stratford until June, 1924, when he was appointed superintendent of the St. Malo, Que., motive power and car shops. Mr. Melanson became superintendent of motive power and car equipment of the Quebec district in February, 1939, and superintendent of motive power and car equipment at Toronto in July, 1943.

PHILIP H. HATCH, assistant mechanical engineer of the New York, New Haven & Hartford at Van Nest, N. Y., has been ap-

P. H. Hatch

pointed mechanical engineer, with headquarters at New Haven, Conn. Mr. Hatch

(*Continued on next left-hand page*)

was born at Albany, N. Y., on May 25, 1899. He attended public school, the Albany Academy, and was a graduate in electrical engineering of the Massachusetts Institute of Technology in 1921. He became a student engineer in the testing department of the General Electric Company at Schenectady, N. Y., in 1921, and computer in the employ of the Cleveland Union Terminals Company at Cleveland, Ohio, in 1922. In 1923 he entered the service of the New Haven as a special apprentice at Van Nest and Stamford, Conn. In 1924 he became electrical inspector at Stamford; later in the same year, engineering assistant at Cos Cob, Conn., power plant; in 1927, engineering assistant at New Haven; in 1928, engineer automotive equipment at New Haven; in 1932, assistant engineer at Van Nest; in 1934, assistant engineer at New Haven; in 1936, engineer automotive equipment at New Haven; in 1938, engineer electric and automotive equipment at Van Nest, and in 1941, assistant mechanical engineer at Van Nest.

J. W. BAILEY, superintendent of the motive power shop of the Canadian National at Stratford, Ont., has been appointed superintendent of motive power and car equipment, Southern Ontario district, with headquarters at Toronto, Ont.

L. H. BEXON, superintendent of National Railways Munitions, Ltd. (a gun carriage plant operated by the Canadian National), with headquarters at Montreal, Que., has been appointed superintendent of the Canadian National motive power shops at Transcona, Man.

D. V. GONDER, superintendent of motive power and car shops of the Canadian National, at Montreal, Que., has been appointed general superintendent of motive power and car equipment of the Atlantic region, with headquarters at Moncton, N. B. Mr. Gonder, who was born at

D. V. Gonder

Pingyao, China, came to Canada as a youth, and entered the service of the Canadian National in November, 1925, as an apprentice in the shops at Stratford. He completed his training in June, 1930, and was transferred to Toronto in September of the same year as a draftsman. The following year he was promoted to the position of mechanical inspector; in September, 1937, became assistant engineer in the mechanical department, and shortly afterwards returned to Stratford as erecting shop foreman. Mr. Gonder then served successively as enginehouse foreman at Stratford, Mimico, Ont., and Montreal until October, 1942, when he was appointed superintendent of the shops at Montreal.

Car Department

N. V. MOORE has been appointed superintendent of the Hayne car shop, Southern, at Spartansburg, S. C.

CHARLES HENRY EITEL, engineer of tests of the Central of Georgia at Savannah, Ga., has been appointed superintendent car department, with headquarters at Savannah. Mr. Eitel was born March 7, 1895. He

C. H. Eitel

entered the service of the Central of Georgia in October, 1911, as a clerk in the accounting department. He transferred to the mechanical department in November, 1911, as a draftsman apprentice; became a draftsman in April, 1917; chief draftsman on September 1, 1937; engineer of tests on April 1, 1939, and superintendent car department on May 1, 1944.

Master Mechanics and Road Foremen

H. W. JARRETT has been appointed master mechanic of the South Carolina division of the Seaboard Air Line, with headquarters at Savannah, Ga.

JOHN W. PHILLIPS, master mechanic of the Milwaukee division of the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Milwaukee, Wis., has retired.

C. J. WILLIAMS, assistant master mechanic of the Southern Pacific at Roseville, Calif., has been appointed assistant master mechanic of the Western Division, with headquarters at West Oakland, Calif.

WILLIAM O. BROWN, general foreman, locomotive department, of the Southern Pacific at Roseville, Calif., has been appointed assistant master mechanic, with headquarters at Roseville.

L. C. KIRKHUFF has been appointed m ter mechanic of the Virginian with h quarters at Elmore, W. Va.

Shop and Enginehouse

H. A. REYNOLDS has been appointed g eral shop foreman of the Southern cific at Sacramento, Calif.

E. C. WAGNER has been appointed g eral foreman, locomotive department, the Southern Pacific, with headquar at West Oakland, Calif.

W. H. MEREDITH has been appointed g eral foreman, locomotive department, the Southern Pacific at Roseville, Calif

D. E. MACKINNON, superintendent h motive shop of the Canadian National Transcona, Man., has been appointed perintendent of the motive power sho Stratford, Ont.

Obituary

DELOS S. WATKINS, who retired in 1 as superintendent of shops of the Sout Pacific, with headquarters at Sacram Calif., died at his home in Lodi, Calif. April 3.

Trade Publication

Copies of trade publications descri in the column can be obtained by w ing to the manufacturers, prefer on company letterhead, giving t State the name and number of bulletin or catalog desired, when i mentioned.

ARC WELDING TOOL AND DIE STEELS C. E. Phillips and Company, 2750 Po street, Detroit 8, Mich. "Arc Weldin the Maintenance and Construction of T and Dies"—a handbook of engineer data and heat treatment procedures tool and die steels.

◆

FIRE EXTINGUISHER MAINTENANCE Walter Kidde & Company, Inc., 140 Ce street, New York 6. Twelve-page bookl "Inspection and Maintenance of First A Fire Extinguishers." Graphically illu trated with drawings, photographs and sm ple charts.

◆

METAL CUTTING TOOLS.—Haynes-Stelli Company, Kokomo, Ind. "Stellite Star J Metal Cutting Tools," Form 2991, giv sizes and prices of Star J-Metal rou tools as well as extended data on standar square, rectangular and tipped tools; stand ard milling cutter blades, tool holder adaptors, etc.

◆

PLASTIC DRILLS.—Independent Pneumat Tool Co., 600 West Jackson Boulevar Chicago 6. "Tools To Build the World Tomorrow . . . born from the need today," discusses the history, developmen features and specifications of the new Th plastic-housed portable electric drill, a well as the increasing use of plastics f industrial purposes.

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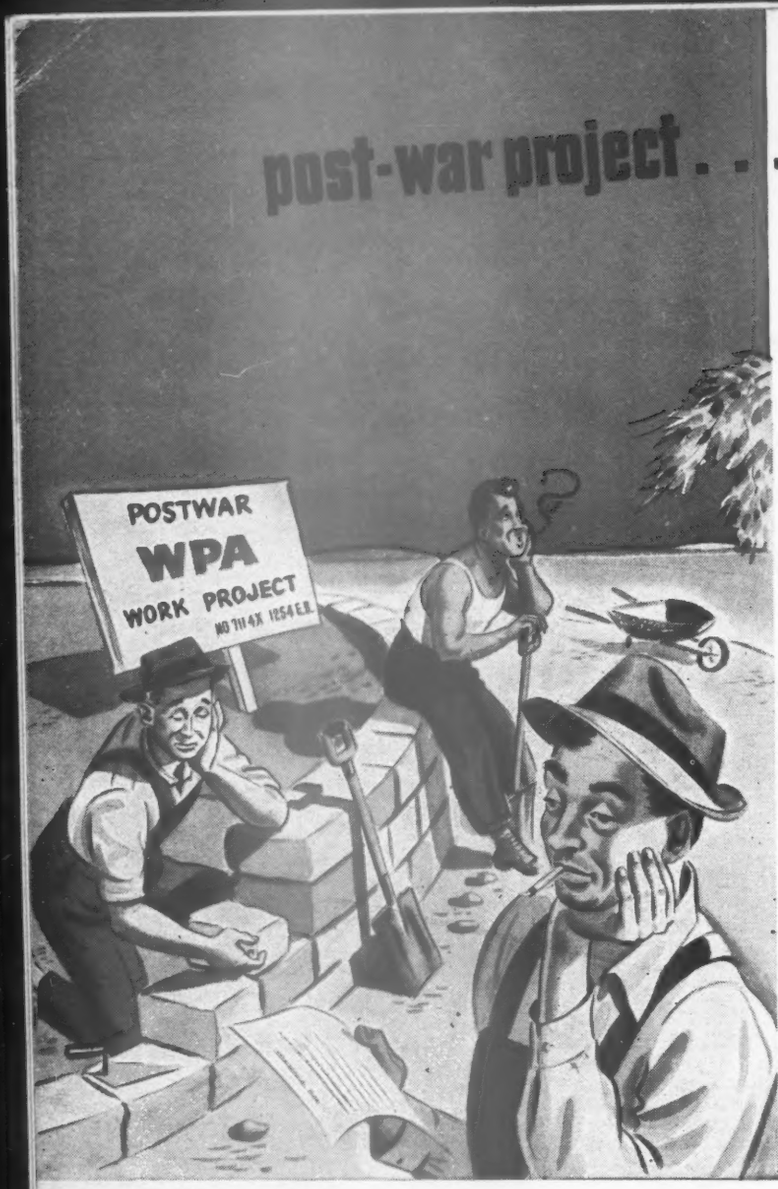
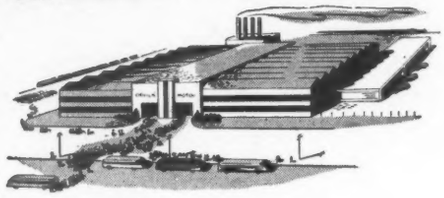


. . . or post-war planning?



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Plan: *A method of action*

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The National Association of Manufacturers (14 West 49th St., New York City 20) has developed several guide books on post war planning. One of the objectives discussed in the first booklet is: "Seek to Reduce Costs." In substance it suggests that manufacturing, sales and operating costs should be reviewed to enable a corporation to operate profitably in a highly competitive economy.

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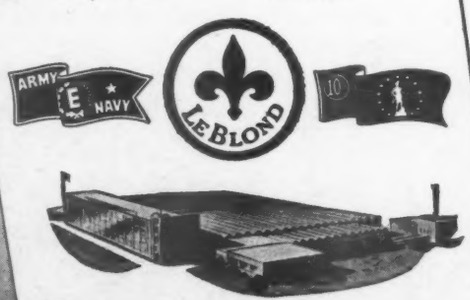

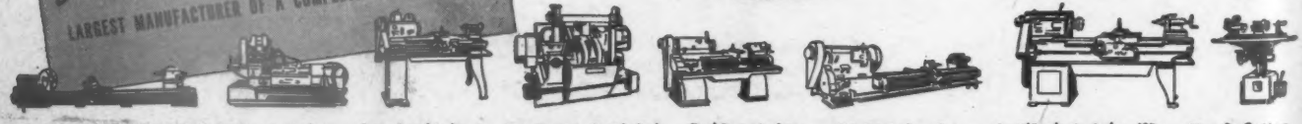

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